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LINK NATURAL PRODUCTS (PVT) LTD



The Green Porridge of Health

Kola Kanda



DIGEST

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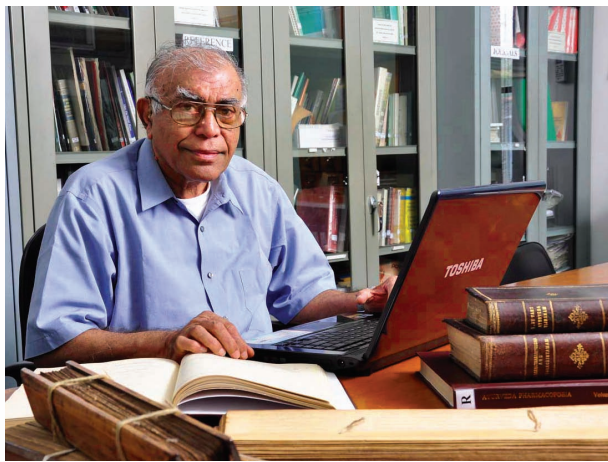
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EDITORIAL

GLOBAL DEMAND FOR NATURAL FRAGRANCES ON THE RISE?



There seems to be little doubt that today consumers all over the world decidedly favour a natural trend in their preference in flavours in beverages, foods and even fragrances. That trend, "back to the naturals" is real and is augmented by sales figures. So the question is posed: What is the need then for Synthetics? It has been noted that consumers are not satisfied even if the synthetic product is proven to be chemically identical or biologically similar to what is contained in a natural source as for instance in the case of vanillin.

There is however a strong case for the synthetics often in the instance of the economics of production. Synthetic substances can come to the consumer at a far lower cost than those obtained from natural sources, and this is often most significant when it comes to the pharmaceutical

trade. Even in the case of fragrances of rarer species of plants and blossoms that are in places that are inaccessible ordinarily such as remote rainforest canopies, the chemical investigation and synthesis of the active ingredient is the lifeblood of the fragrance and pharmaceutical industries. And thus for the sake of science must continue to be encouraged. The discovery of new and potent ingredients built on Mother Nature's patterns will continue to enhance the repertoire of mankind for a long time to come.

R O B Wijsekera

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Link Digest, Please e-mail your request to
info@linknaturalproducts.com*

EDITOR IN CHIEF HONOURED

The Editor of the Link Natural Digest, Dilmani Warnsuriya, is proud to announce that Dr R O B Wijesekera, Editor in Chief of the Magazine, was recently awarded a certificate by the Royal Society of Chemistry, UK in recognition of his long association with the Society and his contribution to the Chemical Science profession.

This is a rare honour achieved by few chemists.



Fifty Years of Membership

*The Officers and Council of the Royal Society of Chemistry
extend to*

***RAHULA OLIVER BARNES
WIJESEKERA***

*their congratulations on completion of
Fifty years of membership in 2017*

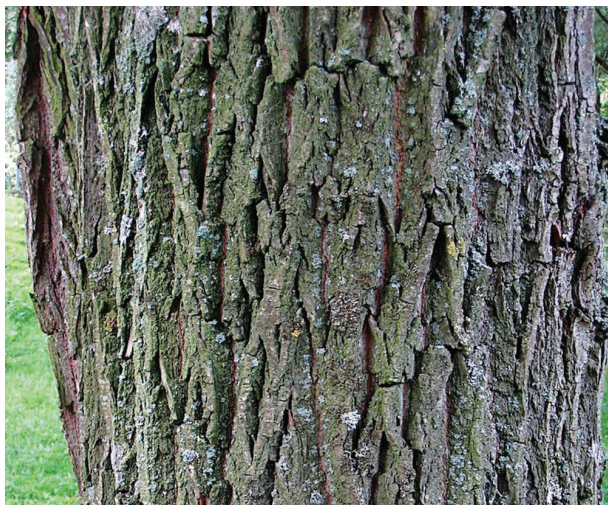
*They send you their cordial greetings with their good wishes
and
sincere thanks for your support*

President

FEATURES

WILLOW BARK TO MODERN THERAPY – THE STORY OF ASPIRIN

By R.O.B. Wijesekera



Preamble

Aspirin is now regarded as the miracle drug of the turn of the twentieth century. Strangely, as it would seem, it was the drug, - in the form of the bark of the willow tree, - that was used by the primitive people in the days far before man's recorded history.

Willow tree bark had been in use in the fight against pain for millennia, but it was only in the mid twentieth century that scientists were able to uncover its chemical secrets. All through the ages, fevers, pain, and inflammatory conditions had been treated with plants containing salicylic glycosides, such as the leaves of myrtle, the bark of willow, the bark of poplar, and meadowsweet.

An Egyptian Ebers papyrus dating circa 3500 years ago had recommended the use of a decoction of the dried leaf of myrtle.

The very first recorded use of salicylate containing plant drugs dates back to about four thousand years, to the Sumerians, who used the pain remedies of the willow tree to treat fevers and inflammatory conditions.



The Chinese as well as the Greek civilizations employed willow bark for medicinal use more than two thousand years ago. The Chinese had used willow as well as poplar bark and shoots to treat rheumatic fevers, colds, hemorrhages and goitre.

The Roman encyclopedia of Celsus, *De Medicine*, ca 30 CE, suggested the extract of Willow for the treatment of the signs of inflammation, and it also appeared in Pliny the Elder's *Natural History*.

Hippocrates, who is regarded as the father of modern medicine, had recommended the chewing of the willow bark to patients suffering from fevers and he also advocated the use of tea brewed from the bark, to lessen pain during childbirth.

Then the Greek physician Dioscorides around 100 CE has prescribed the willow bark as an anti-inflammatory agent.

Notwithstanding the long history of the use of willow bark as a therapy for human ailments, it was not until modern times that a clinical assessment of its efficacy was done, and it was carried out by a Rev. Edward Stone of the Royal Society of London. This happens to be one

of the first such conducted. The results were published in the *Proceedings of the Royal Society* in 1763. It was a study of the effect of willow bark powder on patients suffering from ague, or fevers, then supposed to have been caused by maldour. With the results and disclosure of the successful cure of agues (fevers), was Rev. Stone's remarkable prophetic observation in a letter to the Earl of Macclesfield.

XXXII. An Account of the Success of the Bark of the Willow in the Cure of Agues. In a Letter to the Right Honourable George Earl of Macclesfield, President of R. S. from the Rev. Mr. Edmund Stone, of Chipping-Norton in Oxfordshire.

My Lord,

Read June 2d, 1763. **A**Mong the many useful discoveries, which this age hath made, there are very few which, better deserve the attention of the public than what I am going to lay before your Lordship.

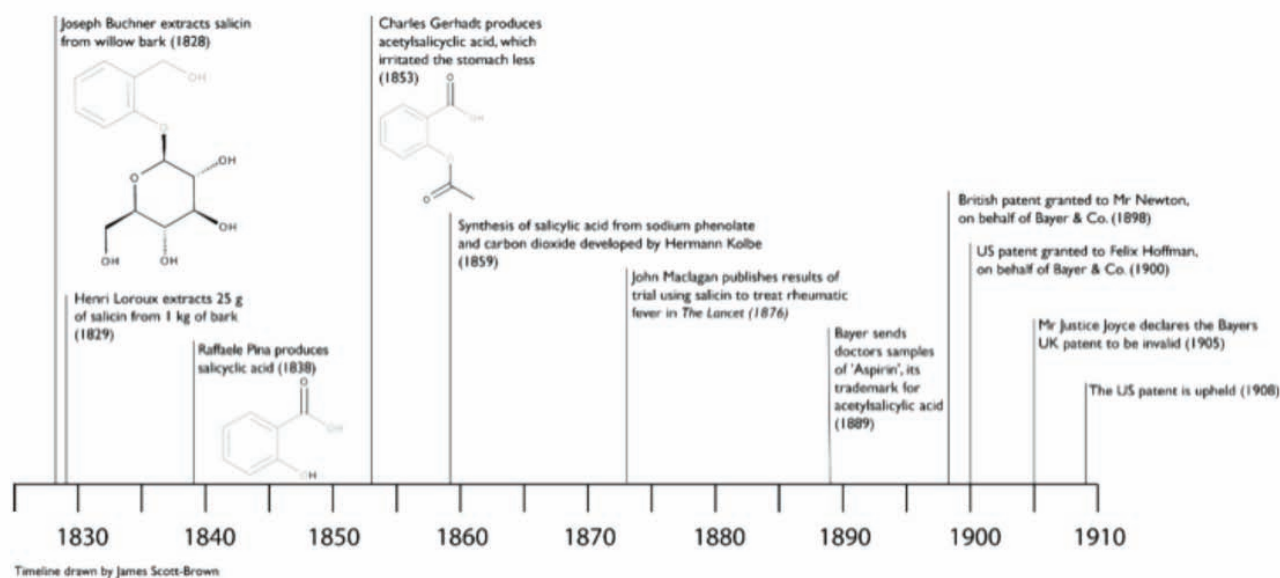
From traditional to Modern

The chronology of events in regard to the use of willow bark, and extending up to its acceptance as a drug named aspirin of modern times, is a remarkable sequence of the historical aspects of traditional to modern medicine.

CHRONOLOGY OF EVENTS

A century after Rev Stone's results, the Scottish physician Thomas McLagan studied the effect of administering patients suffering from acute rheumatism with willow bark powder, and concluded that it relieved pain and inflammatory conditions.

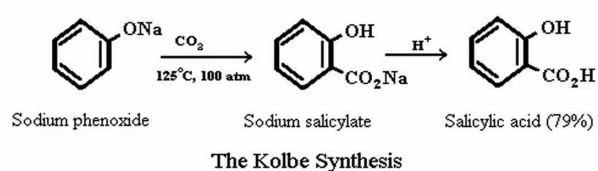
By this time the Napoleonic wars in Europe, had caused limitations on supplies of the Peruvian bark which had gained popularity for the treatment of fevers and so the search was intensified for cheaper and more readily accessible alternatives which included willow bark.



In addition it was noted, that to obtain salicylates from plant sources was not such an economically feasible proposition. In 1860 a German chemist Hermann Kolbe worked out a method of synthesis of Salicylic acid, and this gave a lead to a method of obtaining salicylate drugs for therapy.



Hermann Kolbe

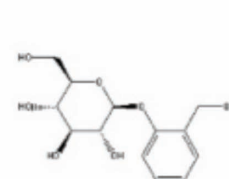


Beginnings of Natural Product Chemistry

Due to the strong evidence then available, the chemical investigations of medicinal plants had already commenced in earnest by the

beginning of the nineteenth century. It was the time when classical organic chemistry was moving in the direction of searching for the chemical ingredients that were responsible for the bioactivity of plants. One could mark it as the beginning of what came to be termed Natural Product Chemistry, or as Phytochemistry. 1

- 1826: Brugnatelli and Fontana (Italians) obtained salicin in impure form
- 1828: Johann Buchner, University of Munich professor of pharmacy, isolated tiny amount of bitter tasting yellow, needle-like crystals, which he called salicin from willow bark

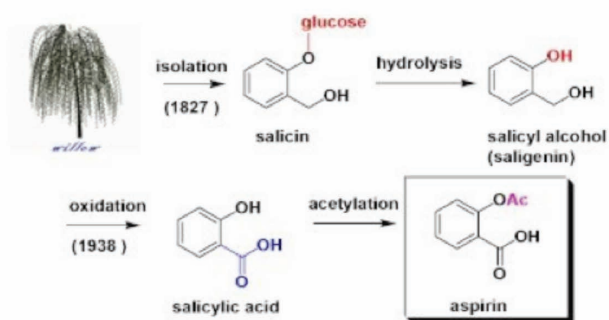


The Peruvian bark was also being investigated in France at the time. (Vide LINK DIGEST 2016).

In 1828, Johann Buchner, a Professor at the University of Munchen, in Germany, succeeded in isolating from the willow bark a yellow substance which he named Salicin- the Latin for willow. A pure crystalline form of Salicin was isolated a year later by Henri Leroux, a French

Pharmacist-chemist, who successfully used it to treat patients with pains of rheumatism.

In the years that followed chemists were able to find that salicin, broke down into salicylic acid, which was the potent constituent in the treatment of pain.



Within the next decade pharmacists and chemists were preparing derivatives of salicylic acid for the treatment of rheumatic conditions and attendant pains. In 1853 the organic chemist Charles Frederic Gerhardt treated acetyl chloride with sodium salicylate, to produce acetyl salicylic acid for the first time.



Gerhardt

That was the birth of Aspirin - a synthetic derivative of a bioactive natural product - and this blazed a trail for the new emergent Science of Natural Product Chemistry, to be followed by researchers for the oncoming century. This aspirin, was a more suitable therapeutic agent than salicylic acid which had given rise on prolonged use to gastrointestinal complications. The salicylic acid treatment had been initiated by the Heyden Chemical Company of Germany.

The commencement of the commercial Aspirin era as we know it today, was when a dye manufacturing company from Germany, Frederick Bayer & Co. acquired the technology for the large scale synthesis of acetyl salicylic acid and, being an already well established company in Germany albeit in the dye industry, nonetheless was able to easily establish brand name recognition for the new synthetic ASPRIN, and as a company now in the manufacture of pharmaceuticals. The company's shift to the production of pharmaceuticals coincided with an increase in new pharmaceutical agents. It is recorded that Felix Hoffmann, the chemist of Bayer in 1897 found that the addition of an acetyl group to Salicylic acid, reduced its gastrointestinal irritation and was a more acceptable drug form.



Felix Hoffmann

This led to the company patenting the process, the US patent following the British patent. Acetylsalicylic acid was christened

ASPIRIN by Bayer. As was to be expected there arose a formidable controversy as to the originator of the aspirin drug but that is detailed in publications in other sources: eg Wikipedia.

It was in 1900 that the first tablet form of aspirin appeared and this created an ease of use that served to expand the recognition of the drug among medical professionals. Medical records highlighted the comparative safety and benefits of aspirin, and its comparative lack of gastrointestinal irritation as with salicylic acid itself. In 1915 aspirin became available to the public without prescription, thus making it arguably the first modern over-the-counter marketed medicine.

Recent Developments & Aspirin versatility

In 1950 Aspirin was recorded in the Guinness Book of Records as the most frequently sold pain killing agent of the day. However physicians never fully understood the mechanism of action of this comparatively simple chemical drug until many years later. This came only in 1970 when John Vane the Professor of Pharmacology at the University of London published his research findings describing the mode of action of aspirin Inhibition of the prostaglandin syntheses in a dose-dependent manner was perceived as its mode of action and the work was to be awarded the Nobel Prize in 1982.



Professor John Vane

Professor Vane was awarded the honour jointly with colleagues Bengt Samuelsson, and Sune Bergstrom. (Nature. New Biology 1971, 231-232).

This type of drug is now referred to as NSAID drugs-- standing for non-steroidal anti-inflammatory drugs. Professor John Robert Vane and his graduate student Priscilla Piper had performed pioneering work on aspirin exploring the effect and mechanism of the drug in controlling pain. They studied the effects of aspirin on isolated lungs from guinea pigs, and the effect of substances released from the guinea pig lungs during severe allergic reaction to aspirin. The scientists were able to identify two substances one of which turned out to be prostaglandin – a hormone-like compound which caused diverse effects on the body including vasodilation, vasocontraction, and dispatching signals of pain and discomfort to the brain. Piper and Vane also discovered that this prostaglandin had an effect similar to a known enzyme responsible for the contraction of nonvascular smooth muscle. They found that aspirin minimized some effects of vasodilation response leading to the final conclusion of Professor Vane, that aspirin was inhibiting the synthesis of prostaglandin.

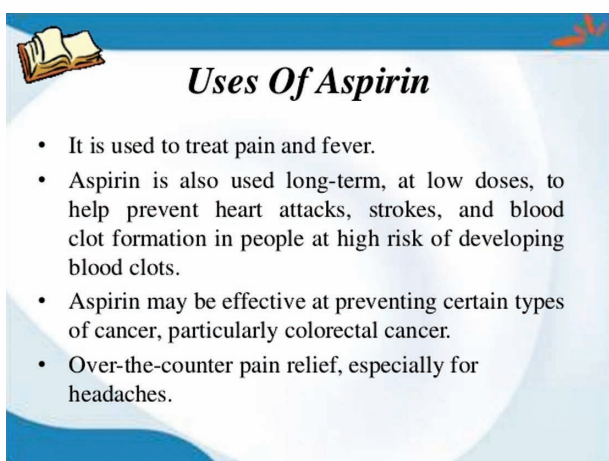
The versatile nature of aspirin is revealed in clinical trials just completed, (Clinical Pharmacist. Sept. 2014 vol 6. No7.online DOI)

- By the mid 1970's randomized controlled trials of aspirin in the secondary prevention of death from heart attack had been performed and the data showed a reduction in total mortality of 12% at six months and 25% at 12 months but the results were deemed statistically inconclusive.
- However by 1994, the cancer benefits of aspirin were confirmed in several studies conducted in the US and the UK. (Cancer Research 1993, 53, 1322)
- Aspirin's benefit towards the prevention of ischemic attacks was demonstrated by the results of CAST, the Chinese Acute Stroke Trial of early aspirin usage. In this study

with 20,000 patients with acute ischemic stroke it was shown that aspirin started early in hospital did produce a small but definite net benefit. (Lancet. 1997 349, 164)

- Aspirin also significantly reduces the occurrence of major cardiovascular events in patients with hypertension and with great benefit seen in preventing heart attacks This is revealed in the Hypertension Optimal Trial that was conducted in 1998 (Lancet. 1998 ,151,1755)
- Investigators from the Harvard Medical School conducted a large primary prevention trial among women in 2005, the results from which suggest that aspirin lowers the risk of stroke without effecting the risk of heart attack or death from cardiovascular causes.(NEJM. 2005, 352, 1293)
- Aspirin is now deemed to have a substantial overall benefit in secondary prevention.
- The benefits from aspirin in retarding and prevention of cancers are also revealed in several ongoing clinical trials.(Annals of Oncology online 2014)

The present-day therapeutic uses of aspirin are wide and varied and emphasize the increasing versatility of this simple chemical drug.



Uses Of Aspirin

- It is used to treat pain and fever.
- Aspirin is also used long-term, at low doses, to help prevent heart attacks, strokes, and blood clot formation in people at high risk of developing blood clots.
- Aspirin may be effective at preventing certain types of cancer, particularly colorectal cancer.
- Over-the-counter pain relief, especially for headaches.

Concluding Observations

As repeatedly observed in the history of medicine, a re-visitation to the past history of the battle against illnesses gives rise to new avenues, for scientific exploration and possible control of disease. From the original willow bark has come the miracle medicine of the turn of the century. The story of quinine arising from cinchona bark also exemplifies this. And now in modern times the award of the Nobel Prize in 2015 to Chinese scientist Mme. Tu, for the anti-malarial drug from the leaves of *Artimesia annua*, adds to the trail of evidence, for the unending mysteries of the plant kingdom. The discoveries of new uses for the natural drugs of old, addressing the new diseases which they are now finding, and that have come to plague humanity, brings another dimension. There are still undiscovered secrets in the plant kingdom of nature which has been the arsenal of therapeutic agents for the entirety of man's life on earth. Although it was one of the very first drugs to come from the plant kingdom into modern therapy, aspirin is still one of the most researched drugs with an estimated near thousand clinical trials conducted each year.

As circumstances change and diseases change and as diagnostic tools improve and as the nature of disease is unravelled it may still find new and more beneficial uses. The simple drug has not finished serving humanity.

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THE GREEN PORRIDGE OF HEALTH (KOLA KANDA)

By Nadeesha Gunasekara



Introduction

Food and beverages and their consumption in Sri Lanka have a long history and tradition. The traditional Sri Lankans did not consume food solely for nutrition, but also for many other therapeutic reasons. Food was thus consumed with multipurpose objectives. During the last few years, stemming from the busy life style of the modern world, western foods and beverages became increasingly popular due to its convenience and traditional food and beverages were relegated to a back seat.

Consumption of different kinds of fast foods, with high level of calories without burning them off, has caused an increase in non-communicable diseases such as diabetes, heart diseases, stroke, cancer etc. Due to the awareness raised on this issue by the media, social web sites and also medical professionals, people are looking for healthy, tasty and natural items that are rich in nutritional values.

Consumption of Herbal porridge or kola kanda could be an ideal way of introducing the goodness of natural foods into the diet on a regular basis, reducing the need for fast foods.



Due to the convenience, taste and nutritional value, Kola Kanda (Herbal Porridge), is becoming a very popular herbal beverage and a wholesome morning meal in Sri Lankan households. It is also consumed by those travelling to work as they are available at roadsides from street vendors and even housewives who make available the porridge outside their houses for an additional income. This traditional Sri Lankan herbal porridge made up of green leaves, rice and coconut milk, is also used as a remedy for some diseases.

To the normal gruel where rice is the main ingredient, different items such as leaves are added to provide extra benefits.

Herbal Leaves usually used for Making Kola Kanda



Kola Kanda can be made with different kinds of edible herbal leaves including Gotukola, Mukunuwenna, Polpala, Elabatu, Neeramuliya, Welpenela, Hathawariya, Iramusu, Karapincha and Ranawara or a mix of any of these.

හෙටුකොළ - *Centella asiatica*



This herb is said to have a direct action on lowering the blood pressure and is often referred to as a rejuvenating medicament. The leaves are believed to purify the blood and cure indigestion, nervousness and dysentery. [1]

මුකුණුවැන්න - *Alternanthera sessilis*

This plant is a cholagogue laxative, and is useful in chronic congestion of the liver, biliousness and dyspepsia associated with sluggish liver. Owing to its diuretic and diluent properties it may be employed with advantage in acute and chronic pyelitis, cystitis, gonorrhoea, and strangury. [2]



පොල්පලා - *Aerva lanata*



A decoction of the plant is a reputed diuretic and considered of great value in lithiasis. The plant is also used for coughs and as a vermifuge for children. [2]

හිරමුල්ලියා - *Hygrophila spinosa*



The plant is often used in traditional medicine, being valued especially as a diuretic. [16]

වැල්පෙනෙල - *Cardiospermum halicacabum*



Welpenela or balloon vine is a well-known traditional herb for nerve strengthening and nerve diseases. Thereby it provides a synergistic effect and enhances sexual performance. The roots and leaves are used in rheumatism, nerve diseases, piles, chronic bronchitis and tuberculosis. [10]

හාතවාරිය - *Asparagus racemosus*



The nutritive properties of Hathawariya are used traditionally to support several functions in the body including moisturizing support of the respiratory tract, promoting healthy energy levels and strength, supporting the immune system and maintaining healthy peristalsis of bowels(9).

ඉරමුසු - *Hemidesmus indicus*

It is one of the best detoxifying herbs which helps in cleaning the body inside out. It has got amazing health benefits in that it helps to purify blood and improves skin texture as well.[15]



කරපිංචා - *Murraya koenigii*



Karapincha plant cures a myriad of ailments. The juice of the fresh leaves is given for diarrhoea and dysentery. [1]

(See article titled Curry Leaf tree in this volume)

රණවරා - *Cassia auriculata*



Ranawara herb is used as a treatment for diabetes. It is also effective in relieving urinary problems, assists in stomach cleaning and restoration of the skin to its natural glow.

මොරකුඹුවිය - *Vernonia cinerea*



The juice of the plant is given to children with urinary incontinence. A decoction of it is also given in cases of diarrhoea, stomach ache and for cough and colic pain. [13]

How to make Kola Kanda

Ingredients

- 1 cup red rice
- 2 cups Herbal leaves
- 3 cups water
- Scraped coconut or coconut milk
- Salt
- Jaggery (optional)

Preparation method

- Select the type of leaves you wish to use.
- Boil rice and transfer into a large container.
- Add fresh coconut milk or scraped coconut into the rice.
- Blend the leaves (about two handfuls) and a one cup of water in a food processor or blender.
- Add the blended leaf mixture into the container with the rice, salt and coconut milk.
- More recipes with slight variations to match your personal taste can be found by browsing “Kola Kenda”..
- Feel free to add more water or coconut milk according to your preference.
- Bring ingredients to a boil for about 5 minutes.

Street vendor selling varieties of herbal porridges (Kola kanda) in Sri Lanka



Getting a taste of Sri Lanka, tourists tasting the alien drink



Health benefits of leaf porridge:

Dark green leaves provide fibre, calcium, vitamin K, iron and even folic acid. Many Sri Lankans prefer to eat leaf porridge on an empty stomach at breakfast.



Benefits

- Treats fatigue, constipation, high blood pressure
- Enhances digestive functions
- Reduces cholesterol
- Prevents cancer and heart diseases.
- Enhances the immune system and helps maintain bones and teeth, as well as reduces inflammation. [14]

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Once you have an innovation culture, even those who are not scientists or engineers - poets, actors, journalists - they, as communities, embrace the meaning of what it is to be scientifically literate. They embrace the concept of an innovation culture. They vote in ways that promote it. They don't fight science and they don't fight technology.

Neil deGrasse Tyson

Learn all you can from the wisdom of the past but do not imagine that the last word could have been said over thousands of years ago.

Jawaharlal Nehru

It turns out that advancing equal opportunity and economic empowerment is both morally right and good economics, because discrimination, poverty and ignorance restrict growth, while investments in education, infrastructure and scientific and technological research increase it, creating more good jobs and new wealth for all of us.

William J. Clinton

THE CURRY LEAF TREE

By R.O.B. Wijesekera



Preamble

For those in the tropical regions of Asia who are bred on a diet that predominantly includes curries of all sorts, the curry leaves are a familiar addition to the ensemble of spices used in their cooking. They are added fresh or dried to enhance flavour or sometimes dried and powdered to make a swift flavor additive. The curry leaf itself is known to every cook and house wife from the super restaurants to the humble kitchens of the vast Asian region.

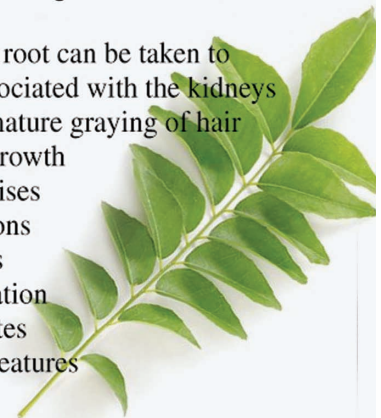
Botanically the curry Leaf tree is identified as *Murraya koenigii* (L) Spreng., and belongs to the family Rutaceae. It is a perennial tree, small and shrubby but is known to grow up to a height of even 1500 meters. It can be found

growing in India, Sri Lanka and other south Asian countries, as a forest undergrowth, and in these countries and the Andaman Islands, Burma and Bangladesh, it is cultivated as a spice used as an integral additive to the local cuisine. The leaves of the curry leaf tree exhibit a strikingly strong aroma profile and hence its attraction as a flavour additive. Recently it has been shown to grow wild in northern India and exhibiting a wide phytochemical diversity in the essential oils derived from the leaves.

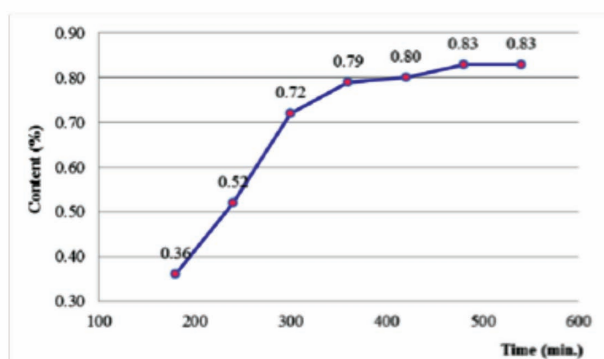
Traditionally it has been used as a medicinal agent, as an analgesic, stomachic and febrifuge, and for the treatment of diarrhoea, dysentery and skin ailments. The fresh juice of the roots are used to combat kidney ailments, while the root and bark are applied externally to combat skin eruptions. Recent scientific observations have reported a plethora of medicinal actions which are evidence based and open up new possibilities for therapeutic use of this plant. These are touted in modern advertisements.

HEALTH BENEFITS OF CURRY LEAVES

- Digestive Disorders
- Kidney Disorders
- Treatment of morning sickness, nausea and vomiting
- The juice of the root can be taken to relieve pain associated with the kidneys
- Preventing premature graying of hair
- Stimulate hair growth
- Treat burns, bruises and skin eruptions
- Prevent diabetes
- External application in stings and bites of poisonous creatures



The Essential Oil of *Murraya koenigii*



The essential oil of the curry leaf has a dominant flavour but its processing in the traditional manner of hydro distillation takes a long time and the yields are poor. The modern method of distillation with supercritical fluids is then a more preferable commercial option.

The main constituents of the essential oil of curry leaf are terpenoid compounds.

On the basis of the relative amounts of the various samples from a variety of sources the presence of several different chemical races can be detected. However this would be an empirical distinction, but the principle structures in the essential oil are those represented in the fig 1.

The principle terpenoid compounds responsible for the characteristic aroma however are those in Fig 1.

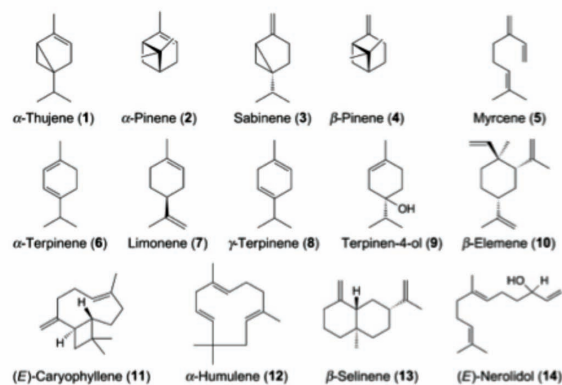
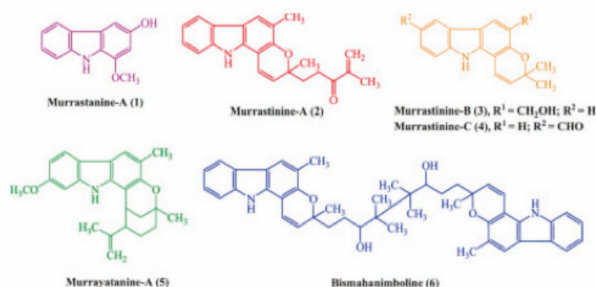


Fig. 1. Chemical structures of the major constituents of essential oils from different populations of *Murraya koenigii*

These terpene constituents of the leaf oil are mainly alpha pinene, sabinene, caryophyllene, beta-pinene, terpinene-4-ol, gamma-terpinene, limonene, alpha-terpinene, and myrcene, but the percentage composition varies so much between the samples from various geographical origins that there seems to be no characteristic common compositional pattern. Other researchers have reported the presence of cadinene and cadinol in addition to the above as contributing to the aroma of the oil.

Hair Conditioner

Apart from its use as a spice additive the leaves of *Murraya koenigii* are employed in the preparation of a conditioner to improve the hair. In this preparation the leaves are extracted with coconut oil and the medicinal ingredients then are extracted into the oil.



Carbazole compounds found in *Murraya* spp

Other constituents of the curry leaf tree are the carbazole compounds, which may perhaps account for the reported therapeutic properties but there is not yet any clear scientific evidence to link any of the curative properties claimed, with scientific facts. Japanese workers have found antioxidant activity in the leaves that they attribute to the carbazole compounds in them.

Ability to penetrate the scalp
Allowing the oil to nourish hair as it grows.

Strengthens hair at the root
Preventing breakage and hair loss.

Helps prevent gray hair
Stops melanin loss & naturally darkens hair

Anti-oxidant
Twice the anti-oxidant power of acai and 17 times that of pomegranate.

Improves scalp health.
Anti-fungal and anti-bacterial properties, treats dandruff and other scalp conditions. Creates better environment for hair growth.

Chelating Agent
Binds copper and iron.



Coconut Oil & Curry Leaves Prevent Hair Loss

Based on ancient Ayurveda practices curry leaves are used in the preparation of oils which are regularly used for the care of hair especially in Asian women who pride themselves in the possession of long and luxurious heads of hair.

Many other health benefits are attributed to the plant besides its use as an additive to curries but these are not authenticated even by long standing evidence. In recent times there is evidence that the blood cholesterol levels are lowered by the regular intake of the leaves of the curry leaf tree and this is recommended for those with high blood cholesterol levels. A combination of curry leaves freshly ground together with an equal proportion of garlic and a touch of salt is recommended as a sambol for regular consumption of curry leaf with a rice and curry meal, to ward off any possible effects of high blood cholesterol levels.

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CONSUMER FRIENDLY HERB SUMMARIES

Although herbal medicines are used abundantly the world over, and becoming increasingly popular, confusion still reigns as to the difference between Herbal Medicinal Products (HMPs) and botanical food supplements. HMPs are regulated as drugs and the latter as food supplements under different EU regulations and requirements. The problem was raised when it was discovered that many food supplements sold in the UK did not contain or contained minute amounts of the products declared on the label. However, this was not the case with HMPs where the labelling requirements were adhered to stringently. Food supplements do not make medical claims and hence their authorisation or regulation is not as demanding as HMPs which do make medical claims.

To give confidence to users of Herbal medicinal drugs, the European Medicines Agency has commenced issuing consumer friendly summaries of the findings of the Committee on Herbal Medicinal Products (HMPC) on its web site. The main purpose of this committee is to review all available scientific data on the use of specific herbal medicines, including information on safety and effectiveness and to issue conclusions in EU herbal monographs on how to use these medicines effectively.

So far more than 140 monographs have been issued, and they include approved therapeutic uses, dosages, possible adverse effects, contraindications and interaction with other medicines.

These monographs will be of invaluable use to all users and producers of herbal medicinal products globally.

HerbalGram No. 108, 2015/2016

ECOSYSTEMS & A VANISHING HERITAGE

By Vikram



A Rain Forest

Introduction

Conserving the heritage of the use of medicinal plants in healthcare has now become one of the major challenges facing the modern world. Mankind is rising albeit too slowly to meet this challenge and there is a danger that if the pace is not revved up it will be soon that all is lost. The global community is addressing the dire issue of conservation of useful plant species that are already endangered and even threatened to soon be extinct, through conventions and organizations' such as the following:

- Global Convention on Biological Diversity
- Convention on International Trade in Endangered Species
- ISHS, WOCMAP, IUCN, UNIDO, & WHO, etc.,

Medicinal Plants grow naturally in many parts of the world but they are cultivated on a large scale only in relatively few instances. Use from the wild sources is very common in most parts of the world and more so in the parts bordering the rain forests which contain the most abundant resources. In fact the Rain Forests have often been termed as "Natures' Pharmacy". This has now given rise to an International Standard for Sustainable Wild Collection of Medicinal and Aromatic Plants, ISSCMAP. There have also been attempts to develop methodologies for such collection from the wild flora such as for example the Himalayan region so rich in species yet so vulnerable to destruction. The Rumanian botanist Ovidor Bojor, had pioneered a method for the "Economic Mapping of Medicinal and Aromatic Plants" in the surrounds of the Himalayan region.

While mankind has been utilizing the potency of medicinal plants in healthcare since even prior to recorded time, there has been for almost the entire history of its usage a tendency to regard the resource as inexhaustible. The change in this attitude is relatively recent and laudable and has been prompted by several factors due to the process now identified globally as "Development". Yet even in these times, the wild resources of medicinal plants form the basis of accessible and culturally acceptable traditional medicines for indigenous and rural populations that form the majority of the world's population.

Yet the stark fact remains that scientific research has still to touch more than a meagre one or two per cent of the plant species so far examined with respect to potential pharmaceutical application. Today, as the subject of plant-derived medicines receives a burgeoning degree of scientific as well as commercial interest, there is so much more pressure on the wild plant populations from which these plant species are harvested. Overharvesting has endangered several species or even rendered them extinct. Commercial exploitation has also led to some of the species becoming unavailable for the needs of indigenous people, who have relied on these traditional remedies since time immemorial. The danger of the Earth being depleted with regard to a major resource is serious and cries for urgent global attention.

The Ecosystems

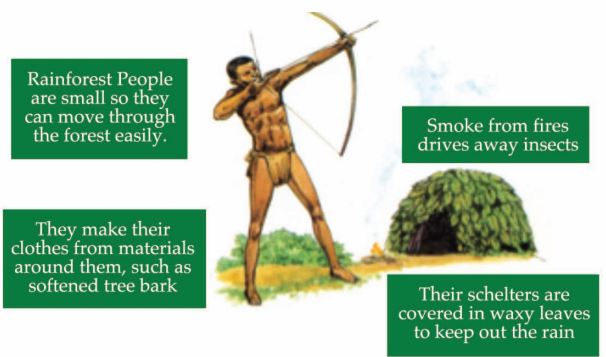
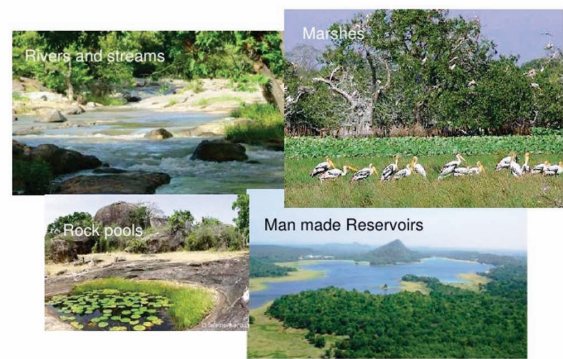
The Health of the ecosystems that govern the earth's progress is crucial to the wellbeing of all the living creatures on earth. These very ecosystems are responsible for the clean water in the waterways and the purity of the air which helps sustain life itself. Ecosystems moderate the climate, mitigate against extreme natural disasters, and render many beneficial effects on human beings themselves. Communities that live in many areas depend on the benefits that the ecosystems can confer. The medicinal and

aromatic plant species that thrive in the natural ecosystems are one of the major resources that the ecosystems have to offer. Up until the end of the last century not more than 80,000 flowering plants were used regularly as medicines. (IUCN- Species Survival Commission 2007, Marinelli., J., Ed.2005, Plants & Flowers of the World., NY, DK Publishing.).

Many of the standard prescription drugs are still based on those with chemical structures related to natural products. In the US it is 74% plant-derived, 18% from fungi, 5% from bacteria and 3% from vertebrate species.,(Ecology Society of America, 1997). Ecosystems are very diverse wherever they be and human and animal life are so dependent on their survival.

ECOSYSTEM DIVERSITY OF SRI LANKA

Inland Fresh water Ecosystems

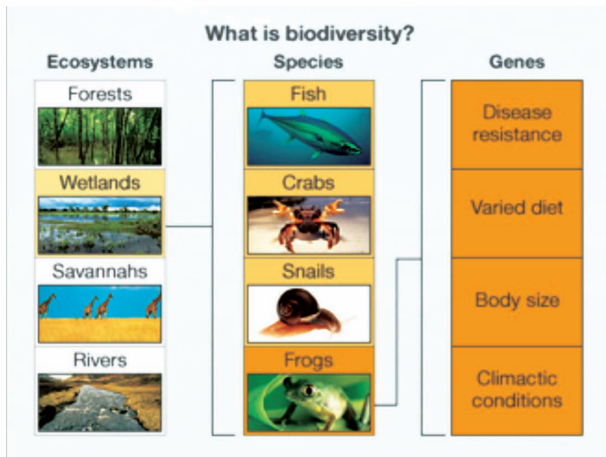


<https://www.slideshare.net/gaminievijith/biodiversity-of-sri-lanka-12858972>

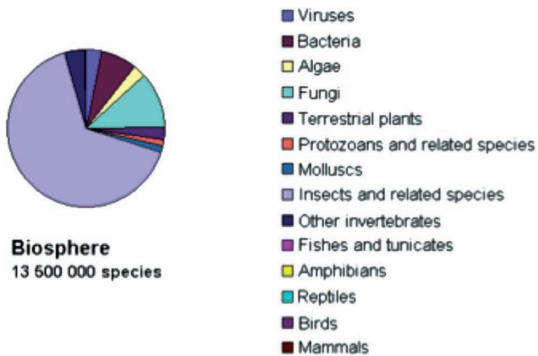
These ecosystems are the potential source of future drugs. They, with their biodiversity, must be preserved from wonton destruction.

Biodiversity

- Variety of living things, number of kinds
- Ecological diversity
 - different habitats, niches, species interactions
- Species diversity
 - different kinds of organisms, relationships among species
- Genetic diversity
 - different genes & combinations of genes within populations



Summary of the biodiversity



Biodiversity of an Ecosystem, refers to the diversity of the habitats which are found within a specific biogeographical boundary, and the biodiversity of the various species that are found within this boundary and as the figures illustrate this covers every living organism. This boundary will include the various forest systems, the wetlands, the savannahs, the rivers and waterways. The inclusive species will be all living organisms such as: fish, and crabs, snails, reptiles and similar creatures including mammals and

birds. Besides this there is the extensive range of genetic biodiversity that will be found within the living creatures.

The life-saving benefits of this natural treasure trove can be illustrated by the story that derives from a long history of therapeutic applications. These are from the history of man's attempts to counter disease and belong to the ages during which plant resources supplied the therapeutic needs of mankind from the earliest times from ancient Egypt, India, and China, through the history of medicine itself, up until the present times. Even in modern America the traditional medicines of their indigenous heritage drawn from the tropical Rain Forests count for considerable value as modern scientific research unearths their intrinsic therapeutic utility.

Tropical Rainforests: America's Medicine Cabinet

There are many reasons people speak up about saving the rainforest, but beyond protecting hundreds of animal and plant species, protecting the rainforest also protects worldwide health. The rainforest, in many ways, is a pharmaceutical wonderland providing all the necessary ingredients to lead healthy lives and cure disease.

Medical Drugs Derived from Rainforest Animals

- Snake** - Snake venom prevents heart attacks
- Harlequin** - From the saliva of a tree-hugging leaf beetle in Borneo
- Slugs** - Slugs secrete substances that help treat infections, mental disorders and HIV

Medical Drugs Derived from Rainforest Plants

- Vanillin/Vanillin** - From the tiny Prosopis of Madagascar used to treat Parkinson's, Alzheimer's and Hodgkin's Disease. The painkilling part from Madagascar is now sold. Prior to 1980, it was the primary source of vanillin for all vanilla products from 20% to 90%.
- Tabacarin** - From the Cuban Liana plant of Amazon used to treat Multiple Sclerosis and Parkinson's Disease
- Curatone** - From the tree bark in Central America used to treat cancer pills
- Quinine** - From the Cinchona tree of South America used to treat Malaria
- Reserpine** - From the Rauwolfia tree of South America used as a blood pressure medicine
- Neocine** - From the tree plant of South America used as a HIV medicine

Statistics

- 1% - 2% of the world's land area and 6% of the world's population live in tropical rainforests.
- 20 - 25% of the world's pharmaceutical drugs are derived from tropical rainforest plants.
- 120 of the world's pharmaceuticals are derived from tropical rainforest plants.
- 25% of the world's pharmaceuticals are derived from tropical rainforest plants.
- 2/3 of the world's drugs with unclear efficacy are derived from tropical rainforest plants.

CANADIAN PHARMACEUTICAL ASSOCIATION

<http://www.canadianpharmacymeds.com/blog/tropical-rainforests-as-medical-resource/>

DESTRUCTION OF THE ECOSYSTEMS

The progressive destruction of the ecosystems through the ages, in other words human-induced biodiversity loss, has come about in many ways, the major ones being the following:

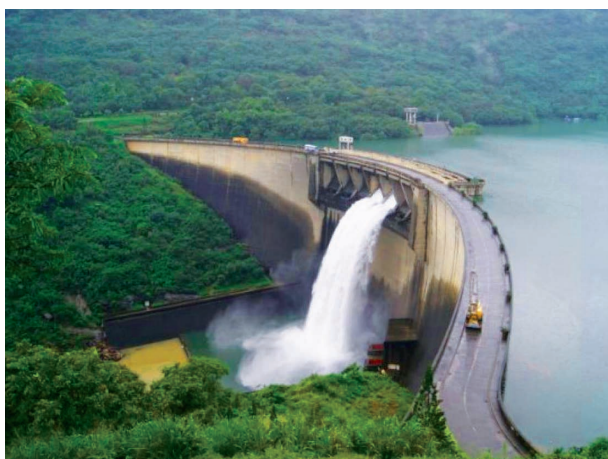
1. Agriculture and land use, & over-exploitation of natural resources.
2. Deforestation for food crops, roadways and community structures.
3. Air and water pollution by industrial operations.

4. Mining, for mineral resources such as gold, coal, gems, plumbago, etc.,
5. Timber production on a large scale.
6. Construction of River Dams, Highways etc.,
7. Natural Disasters and climate change induced biodiversity.
8. Introduced invasive non-native (alien) plant species

The ecosystems are crucial to the wellbeing of the entire biodiversity, humans' included, and their survival too, is much dependent on a healthy vibrant ecosystem. The human Food Chain is fully dependent on pollination of food crops by bees and other insects and any damage to a single vital species may endanger human civilization.



Timber production



Dams & Reservoirs



Agriculture & Food production



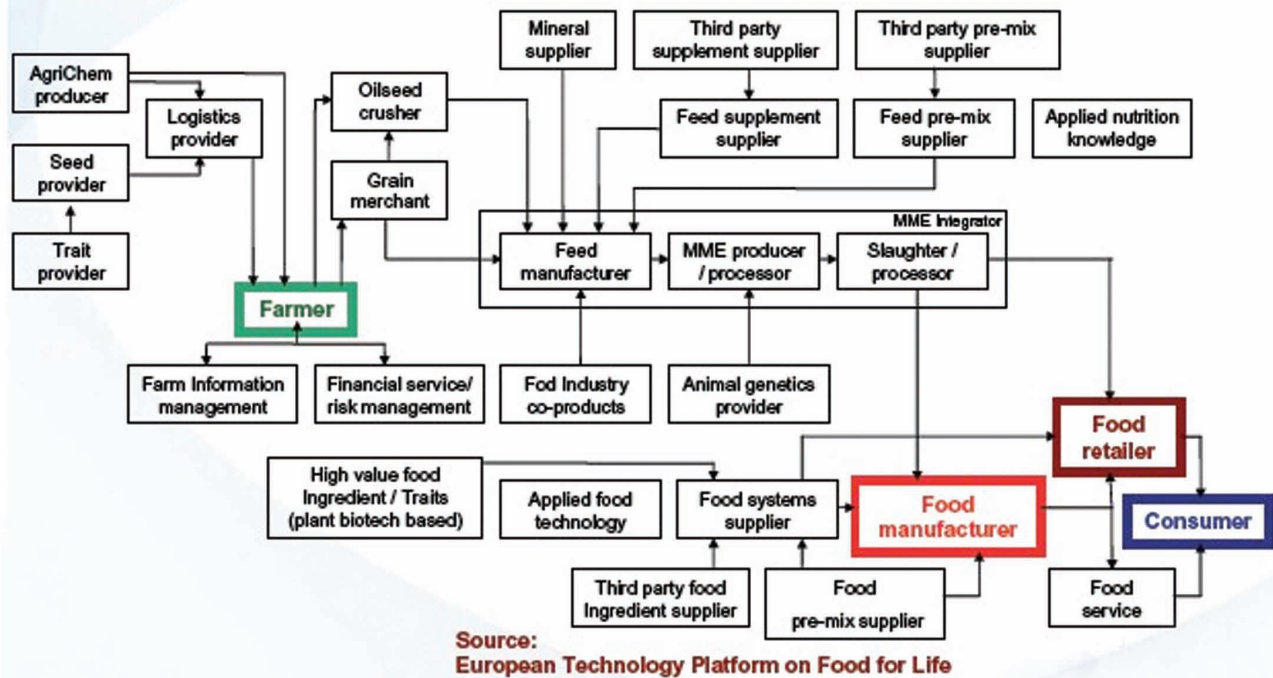
Mining practices

The above are some of the man-derived measures of destruction of the ecosystem

However, the dependence of the human Food Chain on a healthy virile natural ecosystem is undeniable and hence the importance of ecosystem management.



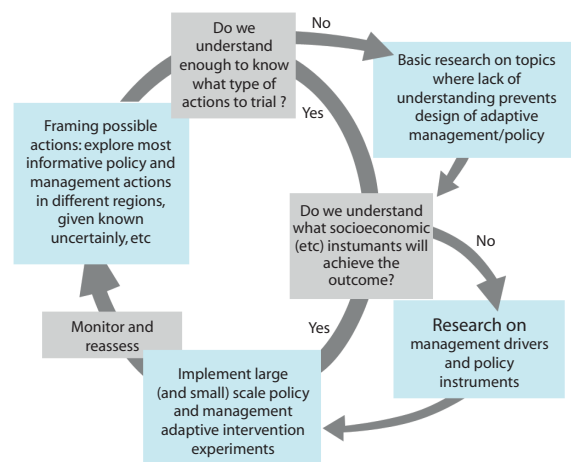
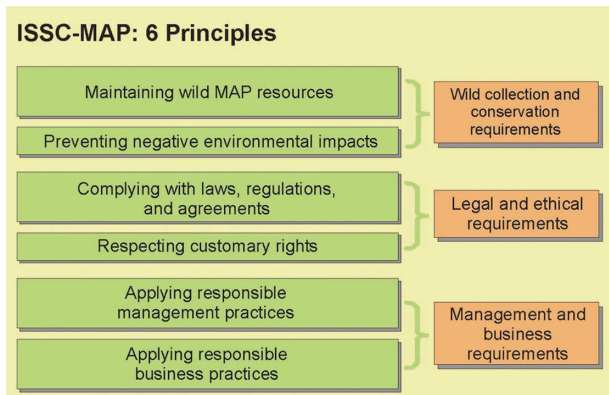
Total Food Supply Chain



Management & Remedial measures

The acquisition of knowledge with regard to the natural resources and their utility to mankind in the long term is crucial to the securement of the ecosystems and the resources and benefits they provide. The plans and strategies must be prioritized on the basis of long term needs and not on short term benefits for the latter option may cause irreparable damage.

In an age where everything appears to be quantified in terms of money (or cost effectiveness in terms of dollars or Euros), no one has been able to cost in that way the negative financial effect of biodiversity losses during the building of for example, a major dam. If that were done the losses in biodiversity in flora and fauna and their potential value over time may exceed the value of the dam by a staggering figure perhaps in trillions in currency value.



<https://www.google.lk/search?hl=en&tbm=isch&source=hp&biw=1366&bih=621&q=issc-map&oq=issc->

Encouraging trends are now emerging in terms of forest biodiversity management and the principles enunciated for the gathering of wild medicinal plant species is a step in the right direction. Basic Research needs have been stressed in order to ensure the formulation of the appropriate policies for the management of the natural resources, and to avoid all possible negative environmental impacts. Also, considerations in respecting rights and customs of the indigenous populations, and to prevent them being deprived of their legitimate legacies is a welcome trend. An assessment of the natural resources and the quantum that may be harvested or mined as the case may be from any specific source must be assessed as a component of the research initiative and the potential of the resource available estimated. Natural resource potential was hitherto taken for granted and small developing countries forfeited their rights in the aftermath of a colonial period. But recently healthier signs of collaboration have emerged where large and opulent companies are endeavoring, jointly together with the host country to ensure a continuing supply of the needed resource while mutually benefitting each other. Notable examples of this laudable collaborative initiative are found in the Fragrance Industry where collaboration with Madagascar in the trade of Vanilla, and the fragrant essential oil of Ylang ylang, are notable examples. The collaboration between the country with the resource and the industry is the way forward for the future.

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Adopt – an – Herb Programme

A novel venture of the American Botanical Council is the Adopt-an-Herb programme. This programme is a mutually beneficial one which supports ABCs non profit educational efforts while promoting a company’s most important herbs.

One of the important benefits of this programme is that it ensures that the most current information on the herb is available through ABCs website Herb MedPro database.

This database provides on line access to abstracts of scientific and clinical publications on nearly 250 commonly used medicinal herbs. A free version HerbMed is general public. This features 20-30 herbs from HerbMedPro that are rotated on a regular basis with an emphasis on adopted herbs.

To become an Adopter, visit www.herbalgram.org/adopt and get the necessary information.

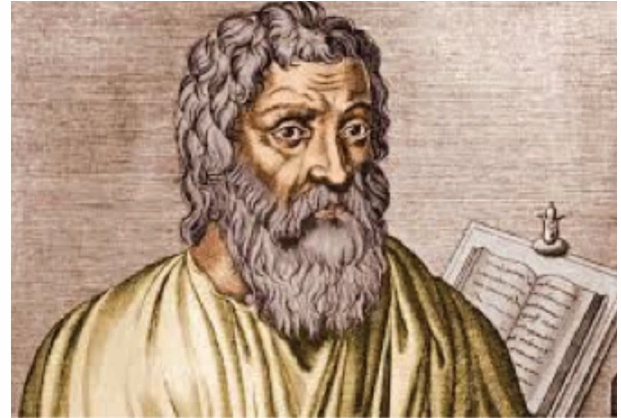
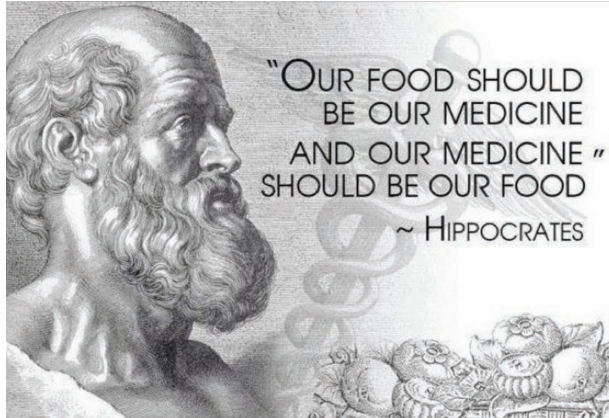
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Oil is a very valuable resource for life - electric heaters. We must have to transition ourselves to a post-oil era. And that's what we must discuss: searching and developing new sources of energy. And that requires scientific research. That requires investment. And the developed countries must be the ones to assume this responsibility first.

Hugo Chavez

HIPPOKRATES OF KOS ICONIC PHYSICIAN OF ANCIENT GREECE & FATHER OF WESTERN MEDICINE.

By R. O. B. Wijesekera

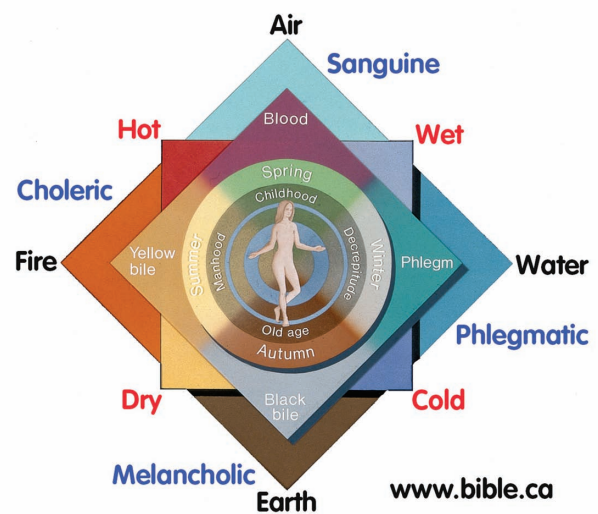


Introduction

Following the progressive decline of the high level of Egyptian civilization, the Greek civilization had reached its peak during the period after 400 BCE. During this period of time those who were sick had been accustomed to go to the temples dedicated to Asclepius, the Greek god of Healing. Greek medicine at the time was pinned to a spiritual background."

The first schools of healing to develop in what then was Greece, were in Sicily and Calabria, now within modern Italy. The most famous of these and the most prestigious was that known as the Pythagorean School. It was at this time that a man named Hippokrates (Hippocrates) emerged, born in the Greek island of Kos and now a renowned doctor preaching the concept that all disease was the result of only natural causes. He was then a physician of considerable repute having had his formal training at the Dream temple in Kos. He was to become a pioneering physician of ancient Greece and is now regarded as the one who laid the foundation of what has come to be regarded as modern western medicine.

The Four Humors of Hippocratic Medicine 450 BC - 1858 AD Melancholy Blood (depression)



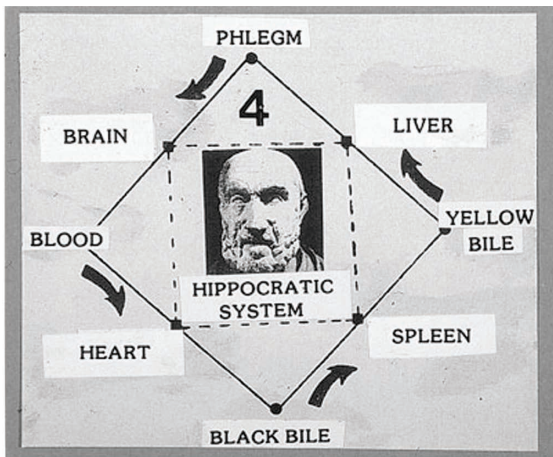
<https://www.google.lk/search?hl=en&tbm=isch&source=hp&biw=1366&bih=621&q=The+four+humors+of+Hypocratic+Medicine>

Hippokrates had at first proposed the theory of the four humors, reasoning the cause of disease in terms of, the imbalance of these four humors in the body, namely, blood, phlegm, and yellow and black bile. Hippokrates is also credited with laying the foundations of medicine as a science. Later, following the lead of Hippokrates, another Greek Physician namely Claudius Galenus, or, as he is commonly referred to now as Galen, was to build on his theories, and his writings became the

foundation of medicine in the middle east and later in Europe as well, for centuries to come.



Galen and Hippocrates



Then other Greek physicians notably Herophilus and Paulus Aegineta, pioneered the study of human anatomy and Pedanius Dioscorides wrote a thesis on the practice of pharmacology. So Hippocrates gave the leadership for the introduction of scientific approaches to medical practice, as against the religious practices, prevailing at the time. He founded what came to be known as the Hippocrates School of Medicine. What was taught in the School revolutionized Medicine and established it as a separate discipline in its own right. Up until then medicine was linked with philosophy together with the practice of rituals, casting off evil spirits and incantations,

(Theurgy). It was Hippocrates and the teaching at his school that established the practice of Medicine as a profession.

The Hippocratic Corpus

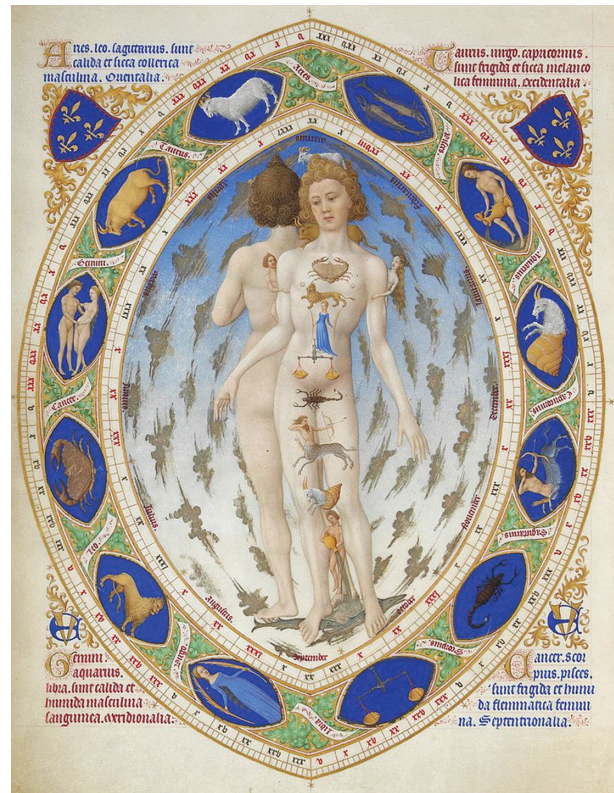
The Hippocratic corpus as it is referred to, was a collection of over sixty treatises, written by various authors and have come to be grouped under the name of Hippocrates. They are supposed to have been written in the lengthy period between 400 BCE and 200 CE and grouped together under the name of Hippocrates probably at the Library of Alexandria. It is clear that none of the treatises could have been written by Hippocrates himself. They include different opinions some conflicting and the evidence is that they were the collection of works of different authors. The subject matter would have been within the domain of interest of the great man himself and this may account for the Library reference as the Hippocratic Corpus. The most significant writings of Hippocrates himself will include the Hippocrates Oath which will be dealt with in the ensuing pages.

Astrology and its role in Greek Medicine

Astrology was at this time in Greece and elsewhere, an important background to medical practices. Astrology in medicine was an ancient system that associated various parts of the body, diseases as well as drugs, as under the influence of the Sun, the Moon and various planets along with the twelve astrological signs. It is recorded that the physician Hippocrates himself insisted that his students study astrology and is reported to have stated: "He who does not understand astrology is not a doctor but a fool." At the time the belief was that all the astrological signs as well as the sun, the moon and the planets, were associated with different parts of the human body. Also many plants were referred to in ancient herbals as being under the influence of one planet or the other. This was used as a codification of the properties of the plants and used for the making of mixtures for the treatment of specific diseases. As needed to respond to

planetary influences, the association of signs with parts of the body were as follows:

| | |
|-------------|---|
| Aries | Head, Face, Brain, & Eyes |
| Taurus | Throat, Neck, Thyroid gland & Vocal Tract. |
| Gemini | Arms, Lungs, Shoulders, Hands & Nervous system |
| Cancer | Chest, Breasts, Stomach & Alimentary canal. |
| Leo | Heart, Chest, Spinal Column & Upper back. |
| Virgo | Digestive system, intestines, Spleen & Nervous system. |
| Libra | Kidneys, Skin, Lumbar region, & Buttocks. |
| Scorpio | Reproductive system, Sex organs, Bowels & Excretory system. |
| Sagittarius | Hips, Thighs, Liver & Sciatic Nerve. |
| Capricorn | Knees, Joints & Skeletal system. |
| Aquarius | Ankle, Calves, Circulatory system. |
| Pisces | Feet. Toes, Lymphatic system, & Adipose tissue. |



<https://www.google.lk/search?hl=en&tbm=isch&source=hp&biw=1366&bih=621&q=medical+astrology&oq>

The Hippocratic Bench & Herbal Therapy

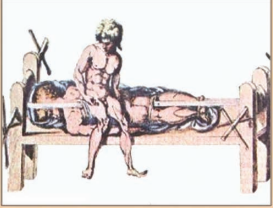
The Hippocratic Bench is another feature which reminds the modern medical world of the innovative greatness of Hippocrates. It is the

forerunner of the modern orthopaedic methodology-- Namely, manipulative therapy

Hippocrates and Hippocratic Bench

He was the first to describe spinal manipulation using gravity
He wrote extensively on the benefits and methodology of manual medicine
He suggested exercises to follow the treatments

- ❑ Hippocrates designed a treatment table (Hippocratic bench) with various wheels, straps, and axles enabling traction to be applied.
- ❑ Therapist's hand, foot or a seated body weight, or even a wooden lever, could then be applied to impart pressure on the prominent spinal vertebra.
- ❑ Hippocrates method of manipulation survived him for more than 1600 years.





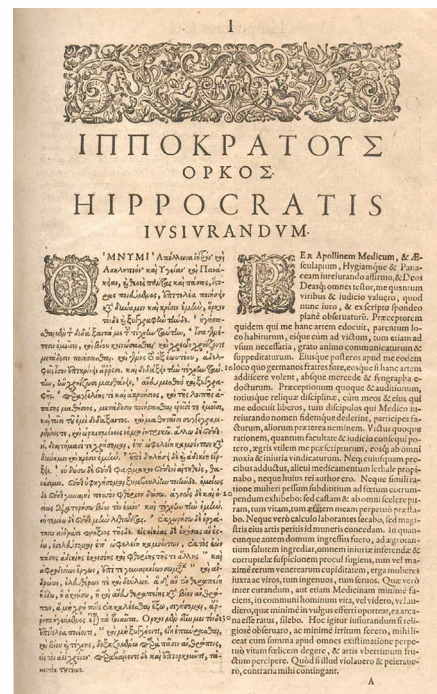
He designed a special bench which has come to be referred to as the Hippocratic bench, to serve as a mechanism for the manipulative procedures he devised. He used it mostly for the setting of bones and for curing problems of the lower back and spine. The patient would be made to lie on the bench and the angle would be adjusted to the optimum position. Ropes would be tied to the arms, legs, feet, and waist of the patient. Winches would then be used to pull and tighten the ropes as desired in accord the requirements for the manipulation therapy. Often when slow manipulation was to be used as in correction a curvature of the spine he was to use gentle gravitational methods for tensioning. This method was used for decades thereafter.

Another fact is that the ancient Greek Medicine, and undoubtedly the therapies used by Hippokrates, like our own Ayurveda, were primarily based on medicinal plants, and most of the plants then used are of value even today.

The Hippocratic Oath

The name by which the modern world identifies the work of Hippokrates of Kos, is by the Oath that bears his name in anglicized form. It is an oath that physicians have to take prior to engaging in professional medical practice. It is believed to have been written by the great man himself but there is a view that it was written by students of his based on the ethical codes he strictly observed and inculcated on to his students. There is little doubt that the man himself identified with the practice of all medical practitioners taking the oath and adhering to its strict ethical framework .Over the years several sections have been removed or reworded and its ethical meaning has been rendered milder by being sacrificial to translation. But it is one of the remarkably few factors that have endured if it is only observed by modern practitioners more in the breach than otherwise. Also several modern developments do not find expression in the Oath quite simply because they were non existent in ancient times, or were not identified as such.

The oath is administered to almost every



"Hippocratic Oath".

- The Hippocratic Oath (ancient and modern versions) is one of the oldest binding documents in history. Written in antiquity, its principles are held sacred by doctors to this day: (treat the sick to the best of one's ability, preserve patient privacy, teach the secrets of medicine to the next generation, and so on).
- "The Oath of Hippocrates," held by the American Medical Association's *Code of Medical Ethics* (1996), "has remained in Western civilization as an expression of ideal conduct for the physician."

Hippocratic Oath: The Modern Version

<http://www.pbs.org/wgbh/nova/body/hippocratic-oath-today.html>

I swear to fulfill, to the best of my ability and judgment, this covenant:

- I will respect the hard-won scientific gains of those physicians in whose steps I walk, and gladly share such knowledge as is mine with those who are to follow.
- I will apply, for the benefit of the sick, all measures [that] are required, avoiding those twin traps of overtreatment and therapeutic nihilism.
- I will remember that there is art to medicine as well as science, and that warmth, sympathy, and understanding may outweigh the surgeon's knife or the chemist's drug.
- I will not be ashamed to say "I know not," nor will I fail to call in my colleagues when the skills of another are needed for a patient's recovery.
- I will respect the privacy of my patients, for their problems are not disclosed to me that the world may know. Most especially must I tread with care in matters of life and death. If it is given me to save a life, all thanks. But it may also be within my power to take a life; this awesome responsibility must be faced with great humbleness and awareness of my own frailty. Above all, I must not play at God.
- I will remember that I do not treat a fever chart, a cancerous growth, but a sick human being, whose illness may affect the person's family and economic stability. My responsibility includes these related problems, if I am to care adequately for the sick.
- I will prevent disease whenever I can, for prevention is preferable to cure.
- I will remember that I remain a member of society, with special obligations to all my fellow human beings, those sound of mind and body as well as the infirm.
- If I do not violate this oath, may I enjoy life and art, respected while I live and remembered with affection thereafter. May I always act so as to preserve the finest traditions of my calling and may I long experience the joy of healing those who seek my help.

—Written in 1964 by Louis Lasagna, Academic Dean of the School of Medicine at Tufts University

medical practitioner the world over in its modern form which has the approval of the World Health Organisation itself.

treatment. His views on Professionalism too were strictly expressed.

The Hippocrates Physical features Observations

The Hippocrates School had besides its ethical code very strict practices of patient observation and they were pioneers in recording such for posterity. The main recordings came to be referred to as the Hippocratic Face and Hippocratic Hands. The recorded physical features which were subsequently used as diagnostic features for patients. These physical features revolutionized diagnostics and



PROFESSIONALISM



Hippocratic medicine was notable for its strict professionalism, discipline, and rigorous practice. The Hippocratic work on the Physician recommends that physicians always be well-kempt, honest, calm, understanding, and serious. The Hippocratic physician paid careful attention to all aspects of his practice: he followed detailed specifications for, "lighting, personnel, instruments, positioning of the patient, and techniques of bandaging and splinting" in the ancient operating room. He even kept his fingernails to a precise length.

In Conclusion

The celebrated Father of Western Medicine is indeed a historical pioneer and the trail of ethics and medical practices in healthcare that he developed are monumental. They have endured and spread far and wide onto all Europe and even beyond. The Greek contribution towards global healthcare is beyond assessment and the modern world owes much to the ancient Greeks. The question that begs itself though is this?

To what extent are the ethics and practices observed in modern times?

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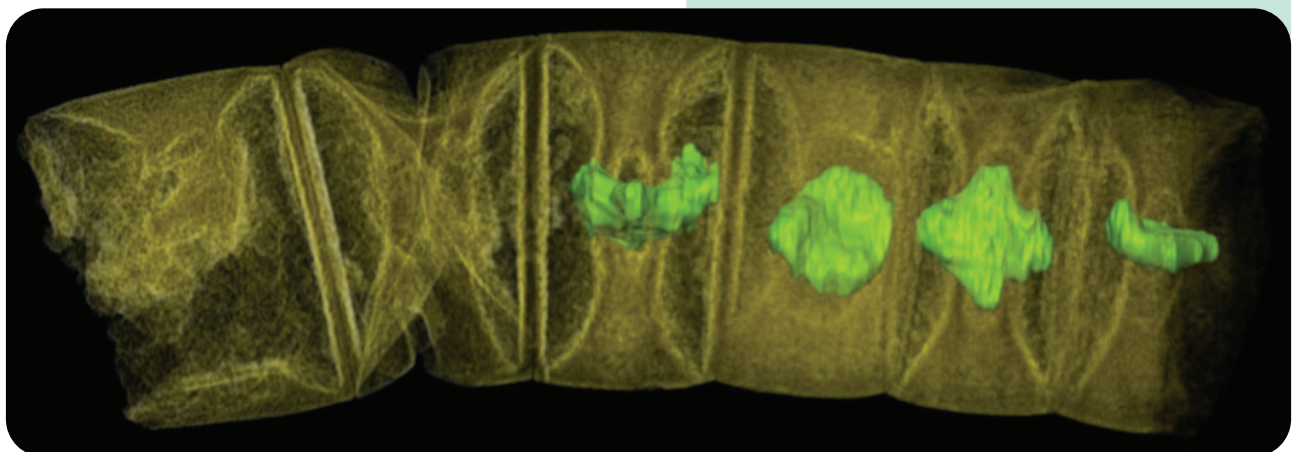
1.6 Billion-Year-Old Specimens May Be Oldest Plant-Like Fossils

Scientists have discovered what may be the world's oldest plant-like fossils, found in sedimentary rocks in central India. The preserved specimens are estimated to be 1.6 billion years old, and contain structures like those found in red algae.

Older fossils of early life on Earth exist, dating back 3.5 billion years, but they represent single-celled organisms that lack nuclei and other specialized cellular structures known as organelles.

The two types of fossils that researchers recently identified resembled red algae — one specimen was composed of filaments and another was made of more robust structures. The ancient specimens are 400 million years older than previous fossil algae discoveries, and hint that multicellular life evolved on Earth far earlier than was once thought.

<https://www.livescience.com/58261-oldest-plant-like-fossils-discovered.html>



DEVELOPMENT OF A HERBAL SNAKE REPELLENT PRODUCT

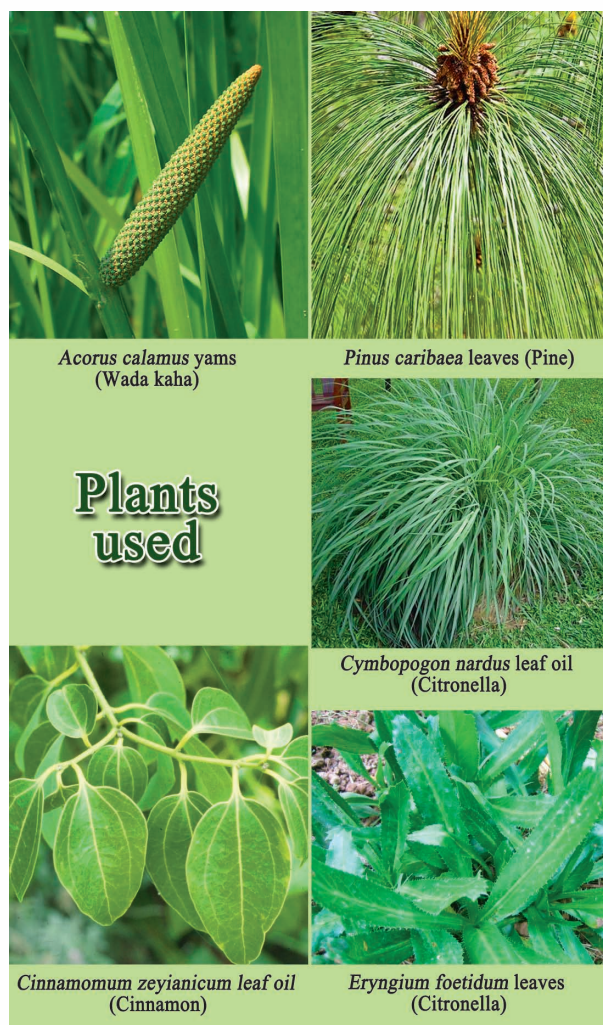
By Hiranya De Silva and Lakshmi Arambewela*

Introduction

More than 3000 species of snakes live in the world, out of them around 600 are venomous and over 200 are considered to be medically important¹. Sri Lanka has one of the highest species densities of snakes in the world. Over 90 species from nine families are represented within the diverse habitats found within the borders of the island. Many of these species are found nowhere else in the world².

Snakes in general are very important in maintaining the ecological balance of nature. In spite of their importance in ecology, snakes pose a serious hazard to farmers, engineers, defence personnel and all others who are engaged in field work. Therefore the need for the development of proper snake repellent substances which could be applied in skin, clothing, or sprayed near human habitations, is obvious³.

The present study was undertaken with a view to evaluate snake repellent activity of essential oils of aromatic plants, and develop a plant based snake repellent product.



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Materials and Methods

Eryngium foetidum, *Acorus calamus*, *Pinus caribaea*, *Cymbopogon nardus* and *Cinnamomum zeylanicum* were used in this study. *Eryngium foetidum* (S. Andu) *Acorus calamus* (S. Wada kaha) & *Pinus caribaea* (pine) were hydrodistilled using the Clevenger arm Distillation Apparatus to obtain the essential oils while citronella (*Cymbopogon nardus*) and cinnamon (*Cinnamomum zeylanicum*) oils were purchased commercially. Fifteen experiments were carried out using five essential oils against 3 snake species. After preliminary trials, 10 percent concentration of the plant extracts was fixed. All dilutions were made in hexane.

The experimental reptiles used in the bioassay for eliciting quantified repellent response (repellency index-RI) to the treatment were three poisonous snakes, viz. *Naja naja* (cobra), *Daboia russelli* (Russell's viper), *Bungarus ceylanicus* (Common krait) which were all adults measuring more than one meter in length.



Naja naja (Nagaya)



Bungarus ceylonicus (Karawala)



Daboia russelli (Polonga)

A specifically constructed cage after the design of Dorris Gove and Burghardt (figures 1 and 2) was used to test the responses of the snakes to the essential oils. The cage had three compartments (figure 1) A, B, and C. Before subjecting the experimental snake to treatment, the snake was released in compartment A. It was given fifteen minutes to settle down in any of the three compartments to which it had free access through a small door which has opening in to the release compartment. After preliminary trials, the experiment was conducted fifteen minutes after the release and after the snake had come to rest. A rectangular filter paper (15×15 cm), evenly sprayed with 5ml of the treatment material and the solvent allowed to evaporate off, was quietly lowered to the compartment containing the snake and time recorded until the experimental snake, reacting to the treatment moved to another compartment (figure 2). As the final product was a gel, in order to test the activity of the product, a rectangular sheet of thin glass (15×15cm) was lowered after applying a film of the gel (5g) to its surface. The negative response of the experimental snake was quantified as the Repellency Index (RI), the ratio of time it spent in the treated compartment¹. This whole procedure was conducted at the Zoological Gardens, Dehiwala premises under the inspection of the staff.

$$RI = \frac{\text{Total period of exposure (15 minutes)} - \text{Period spent in the treated compartment}}{\text{Total period of exposure (15 minutes)}}$$

Total period of exposure (15 minutes)

The maximum RI which could be achieved was unity when the snake immediately responded to the treatment as soon as the treatment paper was lowered. The following scale for RI is introduced³.

| Range | Grading |
|-------------|--------------|
| 0.0 – 0.4 | Poor |
| > 0.4 – 0.6 | Promising |
| > 0.6 – 0.9 | Satisfactory |
| > 0.9 – 1.0 | Excellent |

After the evaluation of the results obtained from the snake trials, the formula for the Snake Repellent product was constructed as 2 percent of each plant extract which made a total of 10 percent plant extract content in the final product. *Acorus calamus* oil (4ml), *Eryngium foetidum* oil (4ml), *Pinus caribaea* oil (4ml), *Cymbopogon nardus* oil (4ml) and *Cinnamomum zeylanicum* oil (4ml) were taken in to a beaker. Carbopol Ultrez along with 0.6g of Methyl paraban and propylene glycol was added to a separate beaker containing 180cm of distilled water. This mixture was stirred well using an electrical stirrer. After Methyl paraban dissolved, the mixture was heated up to 50°C and that temperature was maintained throughout. Meanwhile, the prepared essential oil mixture was added to the mixture followed by the addition of Triethanol amine until the pH of the mixture got adjusted to 5.9. This final mixture was stirred well until the mixture started gelling.

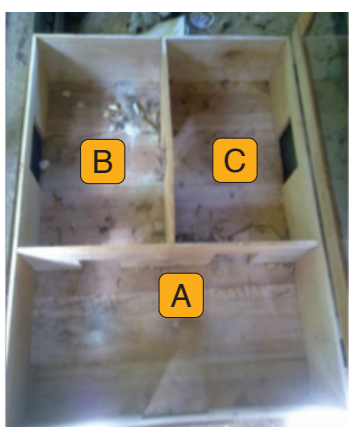


Figure 1



Figure 2

Results

Table 1.
Repellency of essential oils at 10 percent concentration in hexane

| Solution No. | Treatment | Repellency Index | | |
|----------------|------------------------------|------------------|---------------------|-----------------|
| | | Naja naja | Bungarus ceylanicus | Daboia russelli |
| Essential oils | | | | |
| 1. | <i>Acorus calamus</i> | 0.95 | 0.90 | 0.91 |
| 2. | <i>Eryngium foetidum</i> | 0.96 | 0.94 | 0.91 |
| 3. | <i>Pinus caribaea</i> | 0.94 | 0.69 | 0.78 |
| 4. | <i>Cymbopogon nardus</i> | 0.84 | 0.83 | 0.91 |
| 5. | <i>Cinnamomum zeylanicum</i> | 0.71 | 0.67 | 0.78 |
| 6. | Final Product | 0.98 | 0.96 | 0.95 |

Discussion and Conclusion

For the animal trials, the snakes that were responsible for most of the snake bites of the island were chosen. To achieve reliable results, duplicate trials were done for two different creatures of the same species. However, the responses given by a snake in a specially designed cage may vary from that of a snake at its natural habitat. In the experiments, the snakes moved freely from one compartment to another inside the cage and settled down later, in a particular compartment which it found most comfortable. They were kept for fifteen minutes to settle down. This station of rest was abandoned only when the disagreeable stimulus involved in the station and the experimental snake moved to another station where it could again come to rest. To achieve more reliable results the snakes in its natural habitats have to be tested using the developed product .

In the product development step, each extract/oil had about 2% content in the final product which makes a 10% total essential oil content in the gel. A preservative was added to increase the shelf life of the product. As the gel contains citronella, pine and cinnamon oils, the product can also act as a mosquito repellent as well as a disinfectant which is an advantage of the product.

Out of the essential oils that were used, *Eryngium foetidum* exhibited the highest repellent index and the snake repellency property decreased as per following order.

Eryngium foetidum > *Acorus calamus* > *Cymbopogon nardus* > *Pinus caribaeae* > *Cinnamomum zeylanicum*

The final product that was subjected to snake studies was the gel and that solely established a high repellency index (RI) for all three species of snakes than any plant essential oil independently.

Acknowledgement

Honorary Rector, Dean, Lecturers and the Staff of the College of Chemical Sciences, Institute of Chemistry, Ceylon. Mrs. Anoma Priyadharshani, Assistant Director, Mr. P. Peiris and the staff at the Reptiles section, Department of National Zoological Gardens, Dehiwala.

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Life is precarious enough when the weapons of terror lie in the hands of two men only. It will be far more precarious when five or ten men individually or separately, can by misjudgement burn half the world.

Alastair Hetherington: written in the Manchester Guardian, during the Kennedy regime.

You must always have a goal in mind, but, as you go along it costs nothing to stop now and then to enjoy the view around you.

Paulo Cuelho in : The Mnauscript found in Accra.

PROMINENT RESEARCHERS NO.17

PROF GEOFFREY CORDELL

By Dilmani Warnasuriya



Professor Emeritus Geoffrey Cordell is one of the most illustrious and eminent research scientists that we have been privileged to meet. His career as a researcher spans several decades and during that period his versatility in engaging in different areas of research is indeed remarkable and he could serve as a role model for aspiring young researchers.

Professor Cordell is a Londoner by birth and pursued his undergraduate and postgraduate studies at the University of Manchester where he emerged in 1970 with a

Ph D in synthetic natural product chemistry. Having obtained a NATO postdoctoral fellowship he left the shores of Great Britain to continue his research at the Department of Chemistry, M.I.T., and in 1972 joined the Department of Pharmacognosy and Pharmacology, University of Illinois Medical Center to work with Prof. Norman R. Farnsworth, a renowned researcher himself. Having proved himself as an impressive worker, he was made a full Professor in 1980. Thereafter he also held several top administrative positions at the University and counts over 25 years of administrative experience at the Department, College, and Campus levels. Just prior to his retirement in 2007, he held the post of Founding Director of the Center for Advanced Discovery, Research, and Exploration (CADRE) in the Office of the Vice Chancellor for Research, UIC.

Through his role as a leader and collaborator in several projects related to plant based drug discovery programmes funded by WHO, DOD, NIH, NCI, and other agencies, Prof Cordell has over 45 years of research experience on the isolation, structure elucidation, synthesis and biosynthesis of natural products. His efforts

are now focused on developing natural product research programmes where he serves as an advisor and consultant in several countries in various parts of the world, including Sri Lanka. His interests also include strategies for the sustainability and quality control of medicinal agents, the non-invasive detection of biologically active natural products, and the use of vegetables as chemical reagents. His forte has been structural analysis using modern separation techniques and NMR spectroscopy and through his studies his group pioneered the application of several new one- and two-dimensional NMR techniques for natural product structure elucidation.

Prof Cordell set great store in inculcating in young researchers the arts and science of natural product research, and towards this end, he was a research mentor for many graduate students, postdoctoral fellows, and visiting scholars from 26 countries and has conducted workshops for scientists on developing natural products research programs in several countries.

Since retiring from the University of Illinois in 2007, Prof Cordell has been the President of the consulting company, Natural Products, Inc., based in Chicago, which specializes in advising companies and academic institutions on various aspects of the development of academic, research, and natural product research programs.

Another of Prof Cordell's pioneering efforts as a result of his long years of research in the field of plant natural products, was the introduction of a new term "Ecopharmacognosy", which concerns the philosophy and practices of developing natural products as medicinal agents with full consideration for their sustainability (see Link Digest Vol.12. No.1). This term is now well-accepted among scientists.

Prof Cordell is a prolific author, having over 600 research publications, book chapters, reviews, and other professional contributions which have been cited over 21,000 times. Several more books are on the cards presently, covering biosynthesis of plant and microbial alkaloids and on ecopharmacognosy and medicines security in the anthropogenic era.

The recognitions of Prof Cordell's contributions to medicinal and natural product chemistry are manifold. He is an elected Fellow of the Royal Chemical Society, the Linnean Society of London, the American Society of Pharmacognosy and the American Society of Pharmaceutical Scientists and has been conferred with several honorary professorship. He was named the Outstanding International Ethnopharmacologist for 2015 by the International Society for Ethnopharmacology, an impressive accolade indeed. Prof Cordell has made a remarkable global presence having visited over 30 countries as an invited speaker at international meetings and symposia.

Dr Devapriya Nugawela, Chairman of Link Natural Products first met Prof Cordell in Nanjing, China when they both attended a seminar on Traditional Medicine in 2014. Having recognized Prof Cordell as being a potential valuable asset to the company, Dr Nugawela invited him to visit the company in Sri Lanka if he was in the South Asia region. This visit, once accomplished, impelled Dr Nugawela to request his services for the betterment of the company. He now serves as a Senior Scientific Consultant to Link Natural Products (Pvt.) Ltd, a producer of essential oils and plant-based medicines and the company is indeed fortunate to have him and we look forward to many new innovative products on the market due to his advice and support.

PRODUCTS FROM LINK NATURAL

CROWNING THE CROWNING GLORY – OIL TREATMENT

By Hiran baptist and Madhavi Watson



application” not only enhances the health of the head and hair but has an impact on general well being.

Oil massage ritual/tradition

Oil massage for good health and beautiful hair has been an age old practice. It has been passed on from generation to generation by mothers who invariably practiced this massage on their daughters. This intimate act not only provided health and beauty benefits but was a special bonding moment between mothers and daughters. Link Kesha in addition to providing its users with a crown of healthy hair and generating improvements of general good health, also provides relaxation through massaging.

In Ayurveda, the head is recognized as the master of the body, and is referred to as “Sheershapathi” and given great importance in the maintenance of good health. Application of oil enriched with herbal ingredients as an effective treatment is an accepted practice by traditional Ayurveda. It is believed that “oil

Due to the present fast paced life styles, the traditional practices and benefits seem to have evaded the current consumer’s lives. Therefore being a brand with history and with the ability to deliver what is promised, Link Kesha reinforces the mother daughter bonding on this platform effectively.

Kesha and the oiling ritual

Link Kesha the pioneer hair oil brand in Sri Lanka which combines goodness of herbs using the knowledge of modern science, took a new spin in its campaign, undertaking to fulfil the social need of enlightening the modern working mothers (who have daughters of ages between 9-16) about the importance of oil massages and the its functional and emotional benefits which goes far beyond hair nourishment. In the new campaign, Kesha with improved "Link Kesha Extra Rich Hair oil" connects this need of mothers with the age old 'oiling ritual' giving them a crowning head of hair and relaxed minds.

The secret is behind the new improved unique and efficacious formulation of 'Kesha Extra Rich' which combines the following 8 herbal ingredients extracted in pure coconut oil.

- Nilavariya (*Indigo feratinctoria* L.),
- Keekirindiya (*Eclipta alba* (L.) Hassak.),
- Mukunuwenna (*Alternanthera sessilis* (L.) DC.),
- Madatiya (*Adenanthera pavonina* L.),
- Nelli (*Phyllanthus emblica* L.),
- Gotukola (*Centella asiatica* (L.) Urban),
- Savendara (*Vetiveria zizanioides* L.),
- Suwandakottan (*Saussurea lappa* Clarke.)
And
- Natural vitamin E

Of the rich herbal ingredients used in Kesha, Nilavariya (*Indigofera tinctoria* L.) and Mukunuwenna (*Alternanthera sessilis* L.) are known for beneficial effects in maintaining a healthy eye site while Gotukola (*Centella asiatica* (L.) Urban), is well known in Ayurveda for its anti ageing benefits and its effect on memory function. Savendara (*Vetiveria zizanioides* L.) and

Suwandakottan (*Saussurea lappa* Clarke) are medicinal plants that helps to soothe headaches, relax the mind and give sound sleep.

Most importantly coconut oil has the unique ability to penetrate the hair shaft and carry the herbal ingredient into hair roots, thus providing better nourishment.

The benefits in the use of Link Kesha, in improving the overall health of the head region, is thus abundantly clear and the practice should be inculcated in the girl child at a very young age.

Procreation is nature's principal occupation and every man, whether he be young or old, when meeting any woman, measures the potentiality of sex between them. Thus it has always been with me.

Charlie Chaplin in his Autobiography.

"The competent physician, before he attempts to give medicine to the patient, makes himself acquainted not only with the disease, but also with the habits and constitution of the sick man."

- Cicero

"The art of healing comes from nature and not from the physician. Therefore, the physician must start from nature with an open mind."

- Paracelsus

"LINKING" WITH PEOPLE AND SOCIETY

"SAMAHAN" FOR DEVOTEES WHO VISIT "KATARAGAMA & KANDY DALADA PERAHERA"

By Himesh Lahiru

"Vandanavata Kalinma Samahan"

Kataragama and Kandy are two of the most visited places of worship by Sri Lankans particularly, during the perahera (procession) season.



The Kandy 'Esala Perehera' is the major traditional event which takes place in the hill country and it is a cynosure of all eyes.

All measures are taken to ensure that the Perahera is a success. The astrologer attached to the Sacred Tooth (Nakath Mohottala) is required to prepare an auspicious time for the pageant to be inaugurated.

Apart from the Sri Lankan devotees and spectators, the Perahera draws several thousand foreigners and is a major tourist attraction during the season.

The procession is conducted in three different stages

1. Kumbal Perahera (Kumbal Procession)
2. Randoli Perahera (Randoli Procession)
3. Maha Randoli Perahera (Grand Randoli Procession)

The grandest and most majestic of these, are the Randoli and Maha Randoli Peraheras.

Another major traditional event in the South east part of Sri Lanka is the "Ruhunu maha Kataragama Dewala Perahera". The

Kataragama temple is a complex dedicated to the Kataragama deviyo (Gods). It is one of the few religious sites in Sri Lanka that is venerated by the Sinhala Buddhists, Sri Lankan Tamils, Sri Lankan Moors and the Vedda people. It is a collection of modest shrines, of which the one dedicated to Kataragama deviyo, is the most important.



A number of legends and myths are associated with the deity and the location, differing by religion, ethnic affiliation and time.

With the change in devotees, the mode of worship and festivals have changed from that of Hindu orientation to one that accommodates Buddhist rituals and theology. It is difficult to reconstruct the factual history of the place and the reason for its popularity amongst Sri Lankans and Indians based on legends and available archeological and literary evidence alone, although the place seems to have a venerable history.

A larger number of devotees visit this place of worship during the perahera procession, and thus they are exposed to smoke, mist and infection and thus prone to manifest cold and catarrh related symptoms.

As a remedy for this Link Natural products initiated a campaign to provide Link Samahan which is a clinically proven, wholly natural, safe and effective preparation for relief of cold and catarrh related symptoms.

Extensive clinical trials have confirmed that regular use helps prevent 15 common symptoms related to upper respiratory complications.

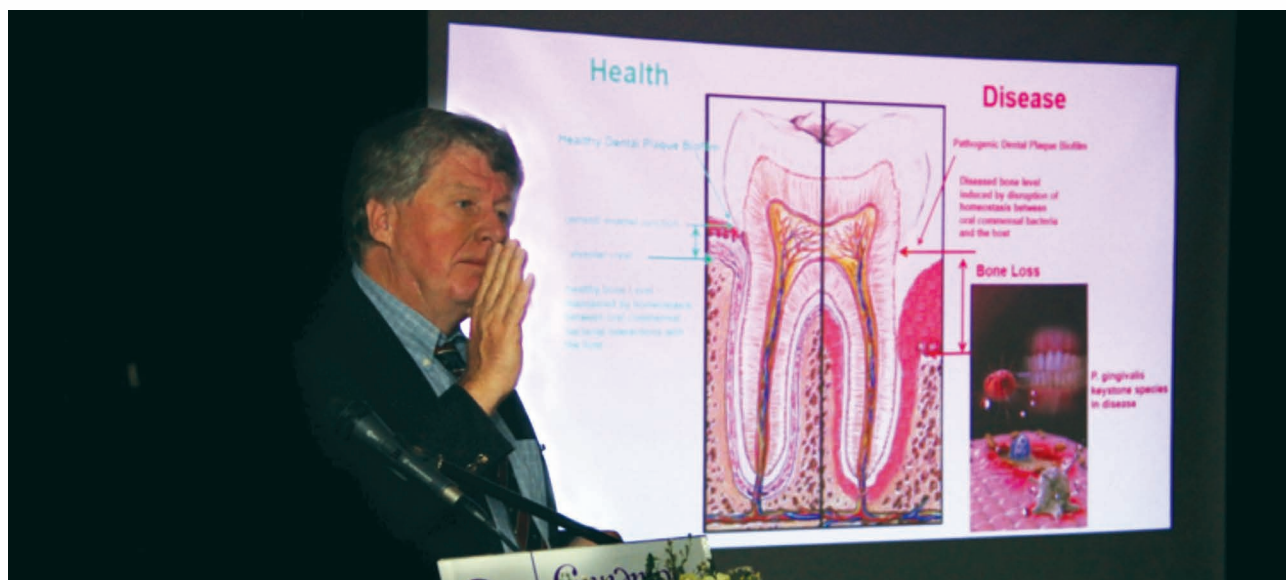


During this year's perahera season, the Link team were able to provide Link Samahan for several thousand devotees, the statistics being given below.

| Location | Duration Devotees | No. of |
|---------------------------------|-------------------|--------|
| Kandy Daladha Perahera | 5th to 7th August | 30,515 |
| Kataragama Ruhunu Maha Perahera | 3rd to 7th August | 31,500 |

HEALTH IS AS COMPLICATED AS DISEASE

By Prof. Tuley de Silva & Madhavi Watson



Prof Richard Darveau, Professor and Chair of Periodontics of the School of Dentistry University of Seattle, USA recently visited the GMP based manufacturing factory and the modern Research & Development facility of LINK NATURAL PRODUCTS, to discuss the ongoing research programme on the herbal extract incorporated into Link Sudantha toothpaste.

The School of Dentistry in Seattle is one of the leading research institutions in USA conducting advanced research on periodontal diseases including mechanisms of action of dental products. Professor Darveau is a distinguished researcher leading a team engaged in mechanisms involving periodontal diseases and treatment. After studying the clinical trial findings on Link Sudantha Toothpaste published in the Ceylon Medical Journal, he was very interested in studying the possible mechanisms of the activities of herbal extracts of Link Sudantha on anti-inflammatory activity involved with the reduction of gingivitic conditions. The two previous clinical trials on Link Sudantha were conducted by Prof. Sunethra Rajapakshe at the Faculty of Dental Sciences, University of Peradeniya. Professor Rajapakshe is presently engaged in further research on Link Sudantha

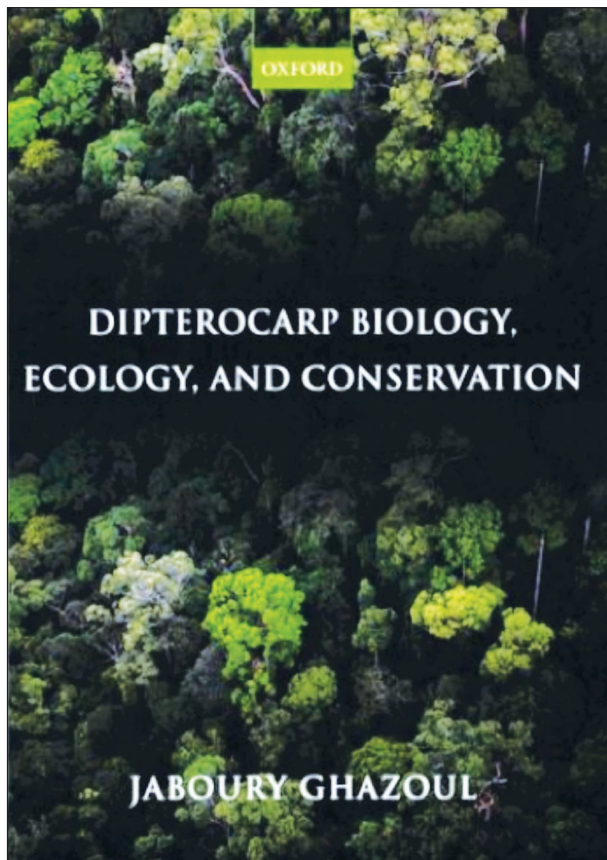
herbal extracts with Prof Richard Darveau, at the School of Dentistry, University of Washington.

“Although we all strive for a healthy living, it is as complicated as disease” stated Prof Richard Darveau , addressing over 200 Dental professionals at the Cinnamon Grand Colombo, on the 28th of June 2017, where he shared his exciting findings of the present ongoing research work on the mechanism of action of the herbal extracts of SUDANTHA”. He said that the results are extremely novel and exciting which are on the inflammation pathways leading to gum diseases such as gingivitis.

Published findings of one clinical trial had established that Sudantha Toothpaste possessed a remarkable anti-inflammatory activity providing therapeutic benefits to patients suffering from chronic gingivitis. Prof. Darveau explained that there are numerous pathways to destructive inflammation. The research group has tested Link Sudantha extracts on several pathways and had achieved conclusive evidence to establish that it has the ability to mediate the inflammatory responses by acting on the pathways.

These novel research findings will be published in an indexed journal once completed.

BOOK REVIEW: DIPTEROCARP BIOLOGY, ECOLOGY, AND CONSERVATION



Title : *Dipterocarp Biology, Ecology, and Conservation*

Author : *Jaboury Ghazoul*

Publisher : *Oxford University Press, 2016*

Publication year : *August 30, 2003*

Edition : *Illustrated*

Pages : *307*

ISBN : *0199639655, 9780199639656*

Asian tropical forests are amongst the most diverse on the planet, a richness that belies the fact that they are dominated by a single family of trees, the Dipterocarpaceae. Many other families contribute to Asia's natural diversity, but few compare to the dipterocarps in terms of the number and variety of species that occupy the forest canopy. Understanding the ecology and dynamics of Asian forests is therefore, to a large extent, a study of the Dipterocarpaceae.

This book synthesizes the current knowledge concerning dipterocarps, exploring the family through taxonomic, evolutionary, and biogeographic perspectives.

Dipterocarp Biology, Ecology, and Conservation describes the rich variety of dipterocarp forest formations in both the ever-wet and seasonal tropics, including the less well known African and South American species. Detailed coverage of dipterocarp reproductive ecology and population genetics reflects the considerable research devoted to this subject, and its particular importance in shaping the ecology of Asian lowland rain forests. Eco physiological responses to light, water, and nutrients, which underlie mechanisms that maintain dipterocarp species richness, are also addressed. At broader scales, dipterocarp responses to variation in soil, topography, climate, and natural disturbance regimes are explored from both population and community perspectives.

The book concludes with a consideration of the crucial economic values of dipterocarps, and their extensive exploitation, discussing future opportunities for conservation and restoration. This will be a useful resource for senior undergraduate and graduate courses in tropical forest ecology and management, as well as professional researchers in tropical plant ecology, forestry, geography, and conservation biology.

GLOBAL MARKET FOR HERBAL SUPPLEMENTS

By Dilmani Warnasuriya

The recently conducted surveys on the market for herbal health supplements and remedies have shown staggering results. It is forecast that by end of the year, 2017, the market will reach \$107 billion. Statistics that have emerged, also indicate a strong growth in the market during the last decade, in spite of the recent economic recession. Several factors could have contributed to this, some of them being the

growing ageing population, consumer awareness on the importance of health and well being, and the trend towards 'going natural'. Constant reminders of the merits of natural health supplements and remedies, their efficacy and the minimum side effects experienced through their use, have bolstered consumer confidence to a great deal, this being further strengthened by the burgeoning products that keep proliferating in the market and titillating the consumers. They have the perception that functional foods and other herbal supplements are the way towards preventive health. Increasing prices of western medicine, high health care costs have further driven consumers towards more economical and safer options of alternative medicines. Another boost towards this trend was the release of the Current Good Manufacturing Practices (CGMP) for dietary supplements by FDA.

In the global market, Europe accounts for the largest share, followed by the Asia-Pacific region and Japan. In the Asia – Pacific region, India and China dominate the market with rapidly increasing products. Regional regulations in these countries play a major in regulating the market. To enter the market, companies have to undergo rigorous testing procedures before acceptance.

The prospects for the escalating use of herbal supplements and remedies is indeed promising.

http://www.nutraceuticalsworld.com/contents/view_breaking-news/2012-03-07/global-herbal-supplement-market-to-reach-107-billion-by-2017

DIGEST MAIL BOX

Letter 1

Dear Editor,

We have been visiting Link Natural as a part of our course unit on Natural products. During our last field visit I was given some of your publications including your magazine LINK DIGEST. I found them to be very interesting and useful for my teaching. And also I can give them to my students as supplementary reading since this course is an applied course having theoretical knowledge is not enough. I would like to get a free copy of every issue. I appreciate if you can send them to the address given below.

Thanking you on advance

Suranga Wickramarachchi
BSc (Kelaniya), PhD (SHU, UK)
Department of Chemistry, University of Kelaniya
Kelaniya, Sri Lanka

Letter 1

We have been receiving your above mentioned publication which indeed we value a lot. I personally have read some volumes of the Link Digest and found them to be very interesting. We thank you very much for sending us this publication which consists of articles of great educational value.

We very much look forward to receiving the future copies of your publication as well.

Kingsley Jayasinghe
Principal, Wycherley International School.

Letter 3

This is to thank Link for their latest "Digest" just received. I do look forward to its fascinating articles which are always high class and from which I learn a lot. For this, I thank you.

Best,

Dr U.Pethiyagoda.

Response

Dear Dr Pethiyagoda,

Thank you very much for those appreciative comments. It is indeed so encouraging that we will strive to improve it further. Any suggestions are most welcome.

Letter 4

We have received the above magazine as gift from 2012-2016.

But our library users would like to refer some previous issues.

As such I would be thankful to you if you could kindly send all the issues of the above magazine before the year 2012.

CND Punchihewa

Senior Asst Librarian
University of Moratuwa, Katubedda

NOTE TO POTENTIAL CONTRIBUTORS

Link Natural 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.

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