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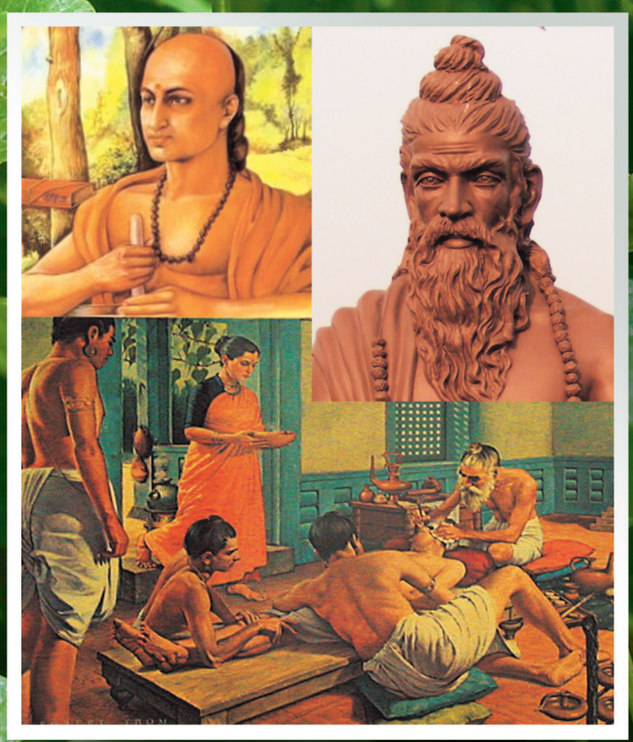

Charaka & Sushruta
legendary giants of Ayurveda

The Wonders of GOTUKOLA

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IN THE PAGES THAT FOLLOW.....

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EDITORIAL

The origins of Medicine go back into the past into many millennia. There are several pathways that gave rise to the medical systems we know of today. Basically, the Eurocentric-system had its roots in the great Arabian empires, and then moved to Greece and Rome, and thence to Europe and the West. The Indo-centric-system commenced with the Vedic period in India and as Ayurveda evolved after the landmark compendia of Charaka and Sushruta, perhaps centuries prior to the peak era of Hippocrates, and Galen in Greece, similar ideas and concepts were known to prevail in both regions. Chinese medicine was evolving in parallel, and through the spread of Buddhism may have even been influenced by the concepts of Ayurveda and Tibetan medicine. There is evidence that the ancient Greeks had contact with Sushruta, and exchange of ideas and practices may indeed have occurred. The military exploits of Alexander may also have initiated some interaction between the Euro-centric and the Indo-centric models. Likewise the spread of Buddhism would have caused a merge of concepts between the Sino-centric and Indo-centric models.

It is clear that all the systems of medicines had similar beginnings. However, anatomical dissection and the progressive application of the discoveries of the basic sciences, have resulted in the comparative advancement of the Eurocentric-system. This Euro-centric model propelled itself faster and wider than the others by the guidance of a rapidly developing science, and post-industrial revolution colonial expansion. Thus modern medicine as we now identify it, separated itself from the original traditional systems. Modern medicine is evidence based, and randomised clinical trials have become the gold standard by which efficacy and safety of treatment is evaluated.

However a need for a deeper understanding of the disease phenomena, driven by the availability of astonishingly precise methods of analysis, and sensitive tools of diagnosis, prompts a re-entry into the theories of disease of a bygone

era. Were some of the earlier concepts the more correct ones? The ideas such as the uniqueness of the human genome point in that direction. This is the question that lies behind the modern thrust towards re-visits to the traditional Chinese and the Ayurvedic systems in the search for new approaches and therapies for disease management.

The traditional theories now appear in a newer light and their examination with all the resources of modern technology can only bring forth benevolent results for the maintenance of human health and wellbeing.

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CHARAKA & SUSHRUTA - LEGENDARY GIANTS OF AYURVEDA

By Vikrama

Preamble

The Indian system of medicine is believed to have commenced following the Aryan invasion of the continent around 1500 BCE, with the *vedic* system. The combined religious philosophies and the concepts of life were embodied in the *vedas* whose origins were in antiquity. They were four in number viz: the *Rigveda,* the *Samaveda,* the *Yojurveda,* and the *Atharveda*. The *Atharveda,* was the oldest text of Hindu India dating from around the Iron age containing information related to human illnesses and cures. It was based on concepts such as exorcism of demons that were thought to be responsible for human ailments and spiritual rituals and magic. However, the *Atharveda* also contained prescriptions of herbs for the treatment of a variety of human disorders. The use of herbs as treatment, and other observations made by practitioners of healing over the centuries, would later form the basis for the development of the "science of Ayurveda".

Accordingly, the origins of Ayurveda can be traced to contributions made by mythological "physicians", as well as those who lived in the times of recorded history. In the first millennium BCE there emerged in post-Vedic India the traditional medical system which came to be known as Ayurveda meaning, "the science of life". The earliest foundations of Ayurveda were built on a corpus of practices which involved the treatment of disease with combinations of herbs, with substantial additions of theoretical concepts dating from 400 BCE onwards. These inputs came from communities of thinkers, philosophers, and practitioners that even included Siddhartha Gautama the Buddha, as well.

The origins and beliefs which gave rise to what is now identified as western medicine, and also, as Chinese traditional medicine, were quite analogous.

We review here the recorded lives and major work of two of the foremost Ayurvedic practitioners whose contributions in the form of their encyclopaedic compendia respectively known as the *Charaka Samhita* and the *Sushrutha Samhita* were special landmarks in the development of Ayurveda in India. They, as most records seem to indicate, probably lived around 100 BCE.

ACHARYA CHARAKA - FATHER OF MEDICINE.

Acharya Charaka, (sometimes spelt as Caraka), is widely considered as the "Father of Medicine" indeed the Father of Medicine as was known to the Indian sub-continent.

Charaka Monument in the Pathanjali Yogeeth campus, Haridwar, India.

The name Charaka was deemed to signify a roving scholar in ancient India, or that of a wandering physician. It has been suggested by scholars that the name Charaka had been used as a generic term for wandering physicians. Scholars suggesting an earlier period such as 400 BCE for the life of Charaka, record that Charaka is quoted in the works of the distinguished Sanskrit grammarians, Panini (520-460) BCE, and Patanjali (*circa* 250 BCE) .Those who favour a later period cite Chinese Buddhist documents that indicate that Charaka was a court physician to King Kanishka. King Kanishka was a Kushan Buddhist king who lived during the first and second centuries BCE, and ruled a wide region that included parts of modern India, Pakistan, Afghanistan, Tibet, and China.

A Portrait of Charaka

However, the Great Acharya Charaka, an eponym of Indian Ayurvedic medicine, was very much more than that. He was indeed a physician and a scholar; but he was also a dedicated researcher and contributed immensely to the development of Ayurvedic science. His relatively modern approach to medicines seems to suggest that he probably lived in the first or second century BC. It seems also possible that the court physician of King Kanishka was a namesake of the great Charaka, and hence the confusion in respect of the dates of his life.

Ayurvedic science as heretofore noted was founded on the collective researches and investigations of many different sages who were also physicians, and most distinguished, in recorded times, was the sage Punarvasu Atreya. Atreya had several disciples each of whom had compiled their own respective encyclopaedic treatises, or *"Samhitas"*. Of all of these the one compiled by the disciple Agnivesha, was regarded as the best, and came to be widely used in the treatment of disease. In time, Acharya Charaka who was then at the peak of his career, revised the treatise which then came to be referred to as the *Charaka Samhita.* For more than two millennia, it remained a respected work on Medicine and was translated into several languages of the day including Arabic and Latin. Today it has its version in English as well. The *Charaka Samhita* as available today, is a text re-revised by Dridthbala (Kashmir 8th century AD) and, contains 120 chapters and is divided into eight sections. English translations of the original Sanskrit text exceed over a thousand pages. The material covered includes: anatomy, physiology, diagnosis and treatment.

According to Charaka prevention of disease is preeminent, and takes precedence over treatment itself, which again takes the form of alignment of lifestyle to be in consonance and harmony with nature and the changes of seasons and environment, which only will guarantee complete wellness. The following statement is attributed to Charaka:

"A physician who is not able to enter the body of a patient with the lamp of knowledge and understanding, can never treat disease. He should first research all the aspects which can impact an individual's condition, and these should include the environment, and only then should the physician prescribe the treatment. It is more important to prevent the occurrence of disease than to seek a cure".

Many writers of ancient medical history seem to agree that Charaka was the first to understand the mechanism of digestion in the human context. He was the first to present a concept of digestion, and concepts of metabolism and that of immunity. According to his interpretations of the VEDAS, a body functions because it contains the three doshas, - *vata, pitta,* and *kapha*. These three *doshas* or principles (humors), approximately representing respectively, movement, transformation, and lubrication cum stability, are the products when the *dhatus,* (blood, flesh, and marrow) act upon the intakes in food and drink. Illness is the result of the disturbance in the balance among the three *dhatus*. The aim of therapy was to restore the imbalance caused by some factor.

Charaka is credited to have known the fundamentals of genetics, the factors that determine the sex of a child, or its genetic defects. He believed that a genetic defect in a child, like lameness or blindness was not due to any defect of the mother or father, but in the ovum or sperm of the parents. Charaka had a true picture of the anatomy of the human body, and its various organs.

According to his view the total number of bones within a body, counting teeth as well numbered 360. However he erroneously believed that the heart had only one cavity but knew correctly, that it was a controlling centre. He knew that the heart was connected to the body by several main channels and countless others of varying sizes that supplied nutrients to various tissues as well as passages to waste products. He was aware that any obstruction in the main channels led to a disease or some deformity in the body.

Under the guidance of the celebrated physician Atreya,the disciple Agnivesha had compiled his *Samhita,* but it was only after Charaka revised it and re-edited it, and that it came to be regarded as the *Charaka Samhita,* and then acquired universal acceptance as the organ of medical knowledge. Charaka had emphasised a rational approach to the etiology and treatment of disease, relying heavily on physical examination and careful observation. In his work he has emphasised that success in the treatment of disease required a team approach, emphasising that the skill of the physician has to be complemented by appropriate nursing care, dietary and therapeutic interventions, and needed the patient's participation in the disease control exercise.

The *Charaka Samhita* is a vast compendium within which is revealed the elements of pharmacology, anatomy, embryology, blood circulation, and features such diseases as diabetes, tuberculosis, heart ailments and many others. The *Charaka Samhita* also describes the medicinal properties and functions of over a hundred thousand plant species, and details as to how they should be collected, stored, and utilised. It specifies the value of diet in relation to health and wellness, as well as the intimate relationship between mind and body – a concept that modern science is only beginning to recognise.

{The Diagrammatic sketches below are from the work of the distinguished Indian surgeon and authority on Ayurveda, Professor Dr.M.S.Valiathan.,- (2003) "The Legacy of Charaka" – Chennai: Orient Longman Pvt. Ltd.}

These diagrams are stated to be based on descriptions attributed to Charaka, and the design of houses of the Kusana period, the time when Charaka lived. The Charaka House (Figure 01) had, it is believed, accommodation for patients, physicians and attendants, as well as for musicians, story tellers and friends; it also had facilities for medication and therapeutic practices and procedures, and was located in serene surroundings. A typical patients' room (Figure 02), had facilities for treatment of the patient, and the furniture and equipment were as prescribed and so were the ventilation and flowers, and such details.

Figure 01

Of considerable interest is the fact that the charter that Charaka had proposed for medical practitioners predates that of Hippocrates by over two centuries. He was an advocate of strict professionalism, and he laid down a strict code of ethics, warning against malpractices by incompetent or unscrupulous physicians who merely wished to profit by the illness of their patients. He believed that treatment should be customized for each patient because the conditions under which illness occurred varied between one patient and another. Overall, Charaka's approach to medicine is regarded as a major milestone in the advancement of Indian Medicine steering it away from the belief that illness was caused by supernatural forces. He restored the belief that natural rather than dubious spiritual forces were needed to cure disease.

SUSHRUTA – INDIAN SURGICAL GENIUS - PIONEER PLASTIC SURGEON.

Sushruta, is one who apart from his idolised status in Ayurveda is today globally recognised as the "Father of Plastic Surgery". He was like Charaka a celebrated Indian eponym of Medicine. Little is definitely known in regard to the early life of Sushruta. He is believed to be the son of the great sage Vishwamitra. He is also believed to have studied medicine and surgery under Divodasa Dhanvantari then the king of Kashi, a region near present day Varanasi. All records indicate that Sushruta had a heritage which was a scholarly one. The ancient Greeks were believed to have known about him, and they are said to have referred to him as "Sucruta".

Portrait of Sushruta

Indeed the ethical principles introduced to the west by Hippocrates, widely acclaimed as the "Father of western Medicine" (460-370 BC), bear close resemblance to the codes promulgated by Susruta and also Charaka. It is not clearly established as to who came before, Susruta or Charaka though many put the latter earlier, recent studies of the literature by C.S.Pandav and colleagues at the Centre for Community Medicine, at the All India Institute of Medical Sciences, New Delhi, seem to place the former at an earlier era.

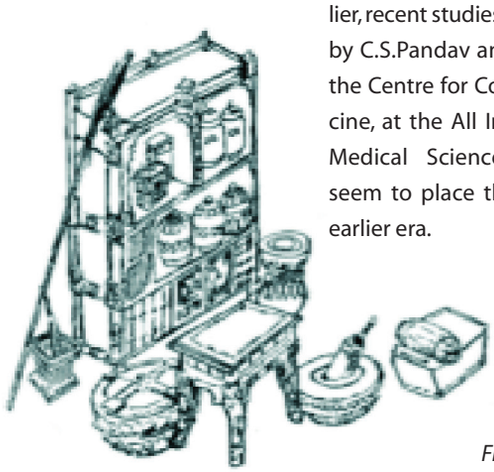

Figure 02

Sushruta seemed to value the balancing of theoretical knowledge with practical experience as the foundation of successful medical treatment. The text attributed to Sushruta was known as *"Sushruta Tantra"* but this is no longer available. What indeed is available is what is referred to as *Sushruta Samhita,* which is a version revised and expanded by Nagarjuna. The *Sushruta Samhita,* as available today, is in two parts. The *purvatantra* and the *uttaratantra* combined constitute the monumental treatise that is *Sushruta Samhita.* It contains chapters on recognition and treatment of diseases, surgical instruments and surgical procedures, and the specialities such as: medicine, paediatrics, geriatrics, diseases of the ear, nose and throat, the eye, toxicology, psychiatry, mental illness, and even aphrodisiacs. Also included within its 184 chapters and over 1,120 medical conditions and techniques are: fistula-in-ano, haemorrhoids, intestinal obstruction, care of wounds, application of dressings, earlobe piercing, cataract surgery, bladder catheterization, the uses of leeches in treatment, and the complete methodology in the treatment of women and children. The chapters include several on the training of surgeons and the practice of surgery. Over 300 surgical procedures are described, and Sushruta classifies human surgery into eight categories. He details 650 drugs of animal, plant and mineral origin. The 300 kinds of specific operations are described as well as 42 different surgical processes and 121 different kinds of instruments (Yantras)

His *Samdamsa yantras* are recognised as being the prototypes of the modern surgical spring forceps, and dissection and dressing forceps. His system of naming tools after the birds or animals they resemble in shape persists even today. For instance: crocodile forceps, hawk bill forceps, are terms commonly used today. His instruments for diagnosis, and their principles modified later with the introduction of optical systems in their construction, form the present day endoscopes. Sushruta initiated types of bandaging, tourniquets, setting plasters, and pre-surgical procedures such as cauterisation by alkalis and heat, modifications of which survive to this day.

It is also claimed by Mehta, in his book: " Sushruta - The World's First Plastic Surgeon",(2002), that he was the first to suggest that the disease malaria was caused by mosquito bites. Sushruta is most famous for introducing "rhinoplasty" which was a procedure commonly required since mutilation of the nose was a standard punishment for criminals. Sushruta is reported to have described the procedure as fol lows:

"Now I shall deal with the procedure for affixing an artificial nose. First the leaf of a creeper, long, and broad enough, to fully cover the severed or chipped part, should be gathered;

a patch of living flesh equal in dimension to the preceding leaf should be sliced off (from below upwards), from the region of the cheek, and after scarifying it with the knife swiftly adhered to the severed nose. To control bleeding the nasal passages should be kept patent, and a suitable dressing applied."

Alcohol, cannabis, and other sedatives as well as herbal painkillers were mentioned to complete the requirement. Later, opium was introduced as an anaesthetic and this is reckoned to be the earliest reference to anaesthetization.

Painting of Susruta the Plastic surgeon at work.

Sushruta, who is reputed to have originated from a rich heritage of reputed scholars, was himself a great philosopher, teacher, and surgeon and the treatise he compiled is testimony to such a heritage. In it he classifies thermo genic traumas such as heat stroke, sun stroke and frost bite, and even injuries caused by lightening under the category he identifies as *vidyut-dagdha,* and in his view they cause similar damage and should be managed in similar fashion. He further indicates that damage caused by extreme cold or heat wet or dry, chemical or inert fluid, should be treated similarly. This concept has also entered the range of modern medicine.

Sushruta was believed to have pointed out that haemorrhage could be arrested by apposition of the cut edges with stitches, application of styptic decoctions, or by cauterization with chemicals or heat.

In the *Sushrutha Samhita* he gives a classification of bones and their reaction to injuries. The types of dislocation of the joints *(sandi-mukta)*, and fractures of the shaft, *(kanda-bhagma)*, have been systematically described. He has classified and described in detail six types of dislocations and twelve types of fractures, with elaborate accounts of the principles of treatment such as: traction, manipulation, appositions and stabilisation. He has described entirely the trauma in respect of orthopaedic surgery and measures of rehabilitation. He was knowledgeable in recognising diabetes as *Medhumeha*. He was indeed aware of the causes of diseases such as hypertension and the consequences of an over sedentary lifestyle, and his diagnoses and recommendations of physical exercise match closely the very modern ideas. He was also adept at urological ailments, urinary stone disease, and endoscopy. In his Sushruta Samhita he deals with anatomy and embryology, and also cataract surgery, and even the techniques of what is today a " Caesarian operation". He obviously possessed the characteristics of a dedicated teacher. He is believed to have taken surgery in medieval India to great heights to an era which came to be regarded as the Golden Age of Surgery.

Sushruta has been described by the modern day surgeon Frank McDowell as follows:

"Through all of Sushruta's flowery language, incantations, and irrelevancies there shines the unmistakable picture of a great surgeon. Undaunted by his failures, unimpressed by his successes, he sought the truth, unceasingly and passed it on to those who followed. He attacked disease and deformity definitively, with reasoned and logical methods. When the path did not exist he made one."

There are those who contend that Sushruta was the most celebrated physician and surgeon of ancient India. Many of his contributions to medicine and surgery were believed to have preceded similar discoveries in the western world. For instance, Sushruta has devoted a complete volume of his experience to ophthalmologic problems in the *Uttar tantrum.* He has enumerated a sophisticated classification of eye diseases, with diagnosis and medical and surgical interventions. Modern opinion concedes that:

"Sushruta has described what may be regarded as the first extracapsular cataract surgery using a sharply pointed instrument with a handle fashioned into a trough. His ability to manage common eye problems with the limited diagnostic aids is a testament to his virtuosity."

Concluding observations

The two *Samhitas* of Charaka and Sushruta spell out the true foundations of the Science of Ayurveda, and illustrates the depth of knowledge within it, as embodied within the two *Samhita's*.. Charaka's compendium was written in the Sanskrit language in verse form, and it was the custom that students of Ayurveda memorised the stanzas, as much as 8,400 in numbers, to learn the text. The Charaka compendium related to *Kaya Chikitsa,* as internal Medicine was known. Charaka laid out the philosophy of Ayurveda and the

relationship of humans to the universe itself. He also specified a code of ethics for practitioners. His methodology was based on careful observation and intuitive evaluation. He describes the manner in which disease is evaluated and therapy prescribed.

The Sushruta compendium was an even more exhaustive one which covered both internal medicine as well as surgery, which is not dealt with in the Charaka compendium. This too was written in the language of Sanskrit which, it is believed, was the most versatile language in India at the time. In style the *Sushruta Samhita* combined both prose and verse. The *Sushruta Samhita* is organised similar to the *Charaka Samhita,* but in addition to emphasising therapeutics, it also details out surgical procedures. Sushruta described the need for and the way to conduct dissections; students might practice on natural or artificial objects, like vegetables or leather bags filled with water. Quartered sacrificial animals were recommended for use in the study of anatomy. Sushruta itemised drugs of animal plant and mineral origin and describes over a hundred different types of instruments. The *Sushruta Samhita* describes a variety of surgical operations such as eye surgery, Caesarian section, limb amputation, hernia repair, etc, which though commonplace today, was unique at the time, which is estimated as being around the first century BCE. Sushruta's coverage of toxicology is more extensive than of Charaka, and goes to a greater extent in regard to first aid, classification of toxic substances, and treatment. Both texts emphasise the Ayurvedic concept of a healthy diet, exercise in regular fashion, and regular habits as a prelude to well-being. It is most probable that both the *Charaka Samhita* and the *Sushruta Samhita* were compiled from various sources from the mid first millennium BCE to almost 500 BCE although they were based on the initial work of the great medical giants who are credited with the initiatives.

The texts are now available in English and a scientific revisit to them by teams of modern multi-disciplinary scientific researchers, as well as present day medical practitioners would greatly benefit humanity. Not the least of their virtues and the gain for patients will be the ethical codes they recommend for practitioners to follow, which in the modern context may be made mandatory.

Sushruta says: ***There can be nothing more magnificent than the act of removing human suffering. The science of life in practice is godly, life giving, indeed it is virtue and fame personified.***

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Boltzman, Ludwig

To go straight to the deepest depth, I went for Hegel; what unclear thoughtless flow of words I was to find there! My unlucky star led me from Hegel to Schopenhauer ... Even in Kant there were many things that I could grasp so little that given his general acuity of mind I almost suspected that he was pulling the reader's leg or was even an imposter.

D. Flamm. Stud. Hist. Phil. Sci. 14: 257 (1983). (7)

THE EAU DE COLOGNE SAGA - And a story of an iconic Tree

By R.O.B.Wijesekera

Farina 1709

4711 version *4711*

Preamble.

The French City of Grasse is today recognised as the centre of the world's perfumery culture and industry. The industry commenced centuries ago, and at that time around half a million "bitter orange" trees are said to have dominated the city's landscape. Today a single tree of the species stands as a sentinel - a grim reminder of a bygone time. What is so special about this tree which the French have known as Bigaradier? It is known to botanists as *Citrus aurantium,* subspecies *amara,* and even as *Citrus bigaradier,* and belongs to the citrus family; but though its fruit is not one that is generally consumed, its blossoms are responsible for the captivating aroma that characterises its presence during the time it is in bloom. From the blossoms, by the traditional method of distillation by steam, is released its essential oil, which gives out the characteristic aroma. This is called neroli or neroli oil, and is one of the costliest of all essential oils. And there begins this story, the story of perhaps the world's oldest longest selling and best regarded perfumery substance.

Modern perfumers describe the tree in glowing terms. One says: "It blooms every April releasing the very essence of spring, the unmistakeable lingering scent that once perfumed the entire region." "This tree is worthy of obsession," says another, " it gives you a range of citrus, wood, flower, and all that lies in between, - clean fresh, dark and spicy." Scientists are uncompromising in the belief that the bitter orange tree is unrivalled in the range of flavour and fragrance materials that can be derived from its flowers, fruits, leaves and twigs. It is regarded as an "encyclopaedia of scents" in the language of perfumers.

The flowers are the most valuable part of the tree, and the neroli oil they generate is a most potent ingredient of perfume formulations leading to the celebrated Eau de Cologne.

One of the modern days' leading perfumers, Calice Becker, of Givaudan, has placed on record her story of neroli and its imprint on her life in poignant fashion thus:

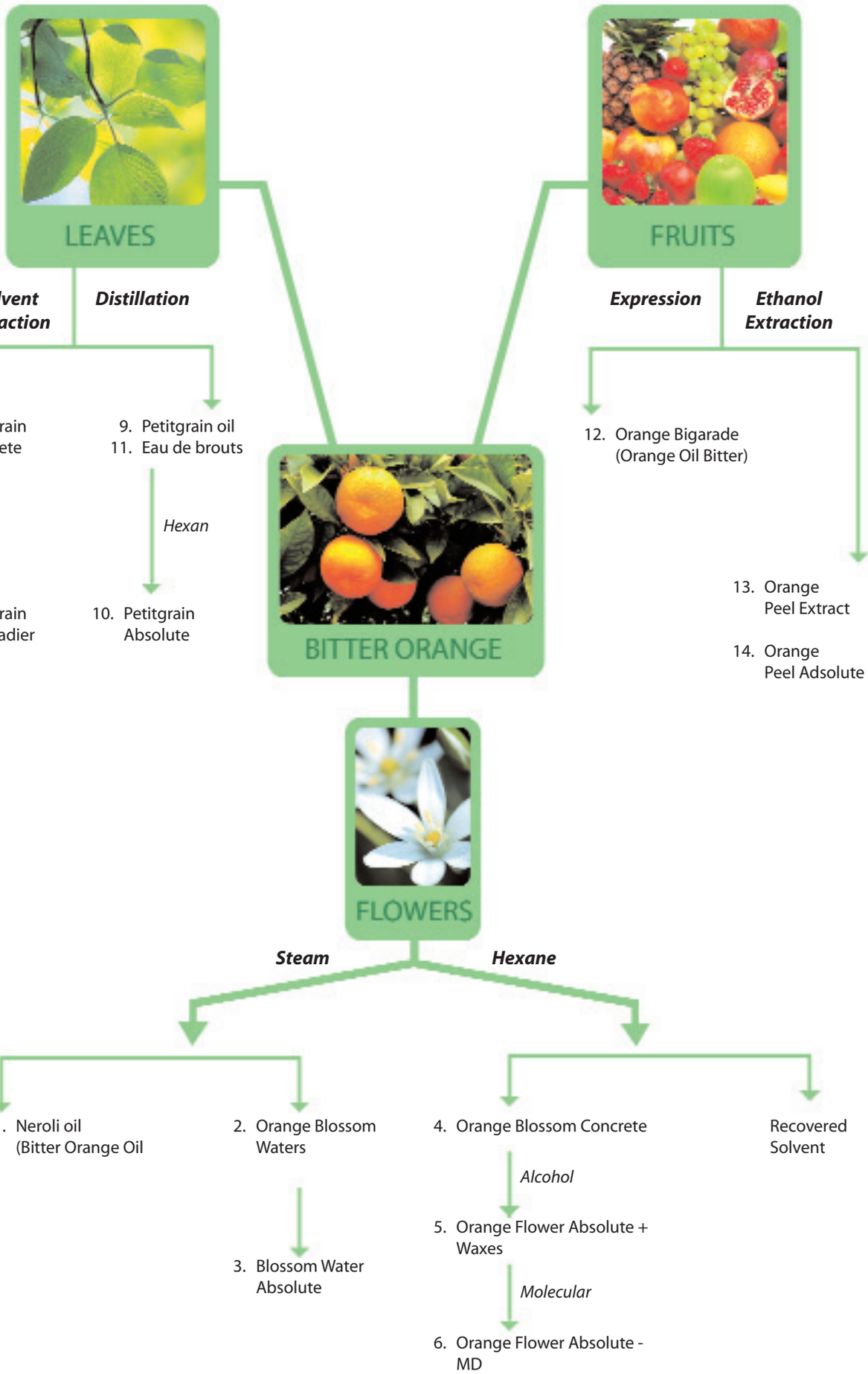
"I was four years old and the memory that I shall share with you will remain with me for the rest of my life. My mother's protective arms helped me out of an evening bath when I noticed a bottle with orange flowers on its label. I pointed to the bottle of Eau De Cologne and can remember a shiver running down my spine as she made me smell its perfume. I can still remember how fresh and delicate the smell was, and my immediate love for this indescribable fragrance. I could not then understand how this magnificent smell was put into this bottle. My mother said it was made of flowers. But how did the flowers get into the bottle, I could not see them and the cologne was crystal clear? Coming short of an explanation my mother just said:"You will understand when you grow up". Years later, while starting my studies in perfumery school I received answers not just to the question of the flowers but to all the processes of making oil for perfumery – more information than my emotions and memories could assimilate. I froze at this moment of epiphany. It was not just learning that this smell came from neroli, the water distillate of the bitter orange flower, but that I finally got my answer, and suddenly recognised this moment of being grown up. With such an emotional connection, neroli has forever imprinted my life as a perfumer."

So it is that, the tale of the world's most famous fragrance begins with the spectacular tree the French call Bigaradier.

The Bitter Orange Tree and its Perfumery Heritage

The iconic Bigaradier.

A modern perfumer considers the Bitter Orange tree an Obsession, on account of the rich range of perfumery ingredients derived from this iconic tree. The different products obtainable by various processes comprise a staggering range. (Vide Chart).



Reference: Pieru Jean Hellivan (2012) Perfumer & Flavorist 37: 34 (Chart drawn by Natasha Jayamanne)

The flowers are indeed the most cherished raw material derived from the tree and they can generate by steam distillation the historic essential oil, neroli, as well as the very valuable absolute, by solvent extraction. The remnant waters, following steam distillation and removal of the essential oil, are saturated with the lesser soluble components of the aroma, and is termed "orange blossom water". This, when solvent extracted, yields the rare, blossom water absolute. The alcohol soluble absolute is considered the quintessential fragrance of the flower, and hence its value in the fragrance market. The peel of the fruit is also used for production of Bigaradier oil by expression or solvent extraction. The tree's leaves and twigs also produce petitgrain oil. All these and other new innovative and exotic products are derived from this tree and hence its iconic status in the fragrance and flavour industry.

Neroli based fragrances grew in popularity and from the nineteenth century through to the beginning of the World War II bitter orange tree orchards dotted the landscape of the French Riviera in a triangle reaching from Cannes to Grasse and on to Menton. Bitter Orange trees grow best at elevations below 400 metres above sea level, and they need a warm climate with sunshine and protection from winds. They are also very frost sensitive, when weakened by pests and disease.

From the 19th century to World War II it was customary to see women and children in Grasse, picking the flowers of the Bitter Orange from about mid-April each year to May. The pickers would stand on ladders placed alongside the trees and as they picked the flowers would drop them onto drapes spread on the ground under the trees. The picking would commence in the morning soon after sunrise with the evaporation of the morning dew. Skilled pickers would know to pick the selected blossoms, ones that were just about to open, as they generated the highest quality of oil. Extraneous matter had to be carefully eliminated. The picker's daily harvest would be around 8-10 kg of blossoms which they delivered to the distillers in Grasse. The distillation was done the following day and the yield of neroli was 0.07 to -.12 % contributing to an annual output of about 1000kg of French neroli oil. The South of France was by far at the time the largest producer of neroli, trailed by Tunisia, Algeria, Morocco, and the West Indies and the global production of neroli was around 1800-2000kg/year.

In 1956, a catastrophic frost almost destroyed the French crop which was dwindling after the war. However the trees that had been introduced into Tunisia in 1903 were faring well in climatic conditions that were ideal for their growing. The Tunisian neroli oil was regarded as nearly equivalent in quality to the French and the so the major supply source began to slowly shift to Tunisia and the northern Africa. Today Tunisia and Morocco are primary producers of neroli. The Tunisians have apparently imbibed the French culture of cultivation, the processing technology, as well as the cultural milieu and festivity that went along with the seasonal practices of harvesting and distillation. So it would seem that the source of the valuable neroli is assured, and due to the lower labour expenditure its cost has also been tempered. From the perfumers stand point neroli oil is very potent and only a small amount in a flavour composition is believed to make a difference. Fabrice Pelligrin, a leading perfumer from Givaudan, Switzerland, has put it thus:

"In the Eau de Cologne orchestra, neroli is the conductor".

The Tunisian Neroli

The Tunisian neroli is considered to be on par with the French product, in quality terms, in the context of the present day industry. Although neroli is available now from several other countries in North Africa, the Tunisian product is the most in demand. The techniques of harvesting the various parts of the plant for processing follows the same practices as in France right up to the festivities that accompany the season. The chemical composition of the neroli follows the French product closely and is approximately as follows:

Alpha- pinene	0.8	%
Camphene	0.1	%
Sabinene	1.1	%
Beta Pinene	11.6	%
Myrcene	2.1	%
Limonene	11.7	%
Ocimene	7.4	%
Linalool	36.4	%
Alpha- terpeneol	5.0	%
Nerol	1.5	%
Geraniol	3.1	%
Linalyl acetate	7.2	%
Neryl acetate	0.8	%
Geranyl acetate	1.1	%
Nerolidol	3.1	%
Farnesol	2.1	%

Source : Carthago Essences. IFEAT Meeting 2010

It is reported that unlike the trees grown in France, the Tunisian trees are often not subjected to agrochemicals, quite simply because they are too expensive for the small co-operative farmers to afford. Much of the neroli oil exported from Tunisia is produced from the blossoms of trees cultivated by small grower's cooperatives and families rather than on large scale cultivation farms.

Present day botanists believe that the bitter orange tree is native to eastern Africa and tropical Asia as well. Today it is grown throughout the Mediterranean region and elsewhere including California and Florida in the United States. It also finds use in foods, cosmetics and aromatherapy products. Bitter orange had been used in Traditional Chinese Medicine, and by indigenous people of the Amazonian rain forest. Current traditional uses for bitter orange are for heartburn, nausea, loss of appetite, nasal congestion and loss of weight. It has also been used for skin conditions. There is however no scientific evidence to confirm any of the health related uses, save its role as a mood enhancer due to the fragrance of its blossoms.

Aristocratic connections of Neroli.

Princess of Nerola

Neroli oil is described by perfumers as "the jewel of the bitter orange ingredients". The oil is stated to have been named in honour of Anne-Marie de la Tremoille, Princess of Nerola, in Italy. The princess, who was also the Duchess of Bracciano, had been an influential social, diplomatic, and political figure between France and Spain during the seventeenth century. She was obsessively fond of the fragrance of Bitter orange, and would use the essential oil of its blossoms to perfume herself while bathing, and also to perfume her scarves, stationery and most famously, her leather gloves. She is said to have popularised its scent for regular use with the aristocracy of Europe at the time. The gloves were even called "Gloves of Neroli" and in Italy they were called Guanti de Nerola, after the princess, who is credited as having introduced neroli as a scent into European society.

The Origins of Eau de Cologne

The word "Cologne" is the French name for the German City of Koln. Hence it may seem ironical, but it is perhaps true that the origin of Eau de Cologne may have had its roots in Italy. According to one legend, it all may have begun with a Gian Paolo Feminis. He is variously described as a perfumer or barber of Valle Vigezzo in Italy. He may have been what is described today as a hair-stylist who had obvious interests in perfumery. He, the legend states decided to leave his homeland in Italy, and immigrate to Germany to try his fortunes in the City of Koln – which the French call Cologne. While in Cologne, legend has it that, he sat at his kitchen table, mixing up a few drops of citrus oil,- which he got from lemons, bitter oranges, grape fruit, and tangerines;he then added bergamot, a few chopped orange leaves, then some lavender, tincture of jasmine,and a dash of diluted alcohol and he had created, a "perfume water" which he called *Aqua mirabilis,* meaning "miracle water" on account of what he noted was, its remarkably captivating aroma. He was at a loss as to what he could do with his discovery and so he was recorded in 1708, to have written to his brother, Jean Baptiste thus:

"I have found a fragrance that reminds me of an Italian Spring morning, of mountain daffodils, and orange blossoms after the rain".

Farina and his aqua mirabilis

He had called it Eau de Cologne (Water of Koln) in honour of the city of Cologne.

This *Aqua mirabilis* reputedly contained grape spirits, oil of neroli, and the oils of bergamot, lavender and rosemary. When it was released to the public in 1709, it is recorded that customers "swept it off the shelves of the apothecaries of the city of Cologne with remarkable speed'. This reportedly had prompted Feminis, to recruit his nephew Giovanni Maria Farina, to assist with the demand. In 1732, Giovanni Maria Farina, as the reports state, had taken over the business, and had successfully marketed the product in Koln, as a cure-all for a plethora of ailments ranging from stomach pains to bleeding gums.

Other legends however, credit the discovery of the *Aqua mirabilis,* or Eau de cologne, as well as the classic story as related above, to a Giovanni Maria Farina (1685-1766), who was reputed to have come from Italy to Koln, and composed a fragrance *Aqua mirabilis.* The kitchen table story cited above is attributed to him, as well as his letter to his brother. In the historical legends, there is apocryphal consensus that the originator of the eau de Cologne was indeed Giovanni Maria Farina.

Nevertheless, word of this *Aqua mirabilis* now launched by Giovanni Maria Farina, had spread fast, during the "Seven Years War" – a war between Prussia and Britain on the one side, and an Alliance that included France, Austria and Russia, on the other. Although Prussia and Britain won the war, Farina had won new customers from Austria, Russia and France, as the soldiers had taken back phials of the aqua mirabilis to their home countries, and the word spread of its miraculous attraction. It was the French who are credited with having popularised the name of Eau de Cologne (Water of Cologne). Giovanni Maria Farina, and his product had by this time become a sensation in Europe. Farina at the time had sold his product, in expensive phials to the exclusive customers like nobility and aristocracy, from his own premises in Cologne. He died in 1766. It was only in 1806 that his grand-grand-nephew Marie Joseph Farina had opened a perfumery business in Paris, that now sells what is the authentic Farina product.

By this time, Eau de Cologne had swiftly become a favourite among the European elite, which included the many mistresses of Louis XV, among them the Comtesse du Barry. It also had become a favourite of Napoleon Bonaparte, who, enchanted by its captivating fragrance, needed several vials of it per day. The endorsement of the Emperor Napoleon had prompted the Farina family to open its outlet to market the product in Paris.

Farina original

Napoleon's desire

Farina scent advertisement

Present Farina House in Cologne

Museum and above the fountain

original phial of Farina

Farina version

4711 version

The stage was then set with an assured clientele, for the entry of several imitators, and these popped up in several places including Cologne and Paris. Many versions of the Eau de Cologne were made some most pretentiously, had adopted the name of Farina. However after a series of prolonged legal battles over the rights to the Farina legacy, spread over the decades, finally, two products have now emerged. The original Farina formula from the Parisian branch and a product now better known as 4711 Eau de Cologne.

The real Farina descendent, a grand-grandnephew, Jean-Marie Farina, was reputed to have sold their formula to one Leonce Colas and retired to Italy. Colas had inherited the same legal problems and in 1982 had sold the formula to Roger et Gallet, which firm today owns the legal rights to the Parisian version, also called, the Farina version of Eau de Cologne extravieille.

While all this was going on with the Parisian version, some of the descendants of the Farina's remained in Cologne, and were marketing the Aqua formula. A perfumer Wilhelm Mulhens also of Cologne had acquired what he claimed was the real formula and had opened his shop in 1803 at a location in No 4711, Glockengasse, Cologne. Mulhens, desirous of capitalising on the Farina reputation was said to have obtained the rights to the Farina name from Carlo Francesco Farina, a Farina with no connection to Johann Maria Farina family. Legal action prevented him from using the name of Farina *Aqua mirabilis,* so he was obliged to market it as 4711 Eau de Cologne- the number of the building his shop was located in. In 1881 it was Wilhelm Mullens' grandson Ferdinand Mullens who, by registration, adopted the 4711 name for both the company and the product, after they had been legally debarred from using the Farina name. The 4711 name had been registered as a trade mark in 1845. The original 4711 building has now been replaced by a modern one as the business has exchanged hands having been acquired first by Proctor & Gamble and then by Maurer and Wirtz an independent subsidiary of the Dalli Group, which notes on its website:

" For over 200 years 4711 original eau de Cologne has been synonymous with sensuality, emotions, and those very special moments in life-A Fragrance with a rich heritage that includes the secret of its recipe and its birthplace."

The Present Scenario

The original Farina Eau de Cologne now celebrates over 300 years of existence as a perfume, while the firm's present Managing Director Johann Maria Farina, a descendent of the original perfumer, still maintains that only around thirty people are privy to the original formula. "It is crucial", he says, "that the original Eau de Cologne always smells the same, like champagne that is made from different wines has the same taste and aroma". He says that they faced many crises and the

hefty price tag of the original was not the major issue. In the turbulent course of history they had been cut off from their resource supplies by first, the French Revolution, and then by the two major WorldWars. It was not that their customers could not afford the high price, but according to the Farina's, their company was therefore unable to maintain consistent production.The firm concedes that they have had to face competition, notably, "from a popular respected imitation:4711". This product is also now over two hundred years on the market, and whatever the relative merits of the Farina original and the 4711 versions are, the latter has enjoyed better marketing, and has been commercially a more successful scent.

Today the Farina House in Cologne's Old Town, has its very own museum where visitors can learn about the original Koelnischwasser – Eau de Cologne.

The 4711 Museum is also housed at the location that was originally 4711 Glockengasse, but now bears different numbering. It is a veritable shrine to the 4711 product. It has an added attraction in the form of a miniature gold fountain from which the celebrated product can be dispensed.

Eau de Cologne is perhaps the oldest continuously selling commercial scent. The Farina version is now over 300 years old, but its better known version of 4711 is also over two centuries in the global market. Today the term "cologne" is a generic term for scents whose fragrance content is of the order 3-5%, while eau de Toilette is the generic term for a product with a stronger fragrance content. Perfumes as such have an even stronger content of fragrance. Many modern perfumers have designed their own versions of both these categories and these address modern needs such as perfumes with wider aroma scope, Fragrances for Men, and for different uses such as, mood enhancers and deodorants. The plethora of raw materials derived from the iconic bitter orange tree, are still the dominant ones used by perfumers for the eau de Cologne types; and neroli leads the list. As a leading perfumer Pierre-Jean Hellivan, of Vigon International puts it:

"The bitter Orange Tree may be long gone from the French Riviera landscape, but its bounty of unique ingredients remains at the forefront of any natural palette."

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I found poverty neither attractive nor edifying. It taught me nothing but a distortion of values, an over-rating of the value of the graces of the rich and the so-called better classes. Wealth and celebrity on the contrary taught me to view the world in proper perspective to discover that men of eminence, when I came close to them, were as deficient in their way as the rest of us. It also taught me to spurn the insignia of the sword, the walking stick, and the riding whip as something synonymous with snobbery,, to know the fallacy of the college accent in estimating the intelligence of a man.

Charlie Chaplin in his autobiography

THE WONDERS OF GOTUKOLA

By Dilmani Warnasuriya

The miracle herb Gotukola

Probably no single plant has been as extolled and revered for its therapeutic and cosmetic value as gotukola. It no doubt deserves the sobriquet of 'miracle herb' of oriental medicine. According to historical records, natives of Sri Lanka were the first to use gotukola for its medicinal properties, and this is something we can be justifiably proud of. They noticed that elephants, which are a species of animals renowned for its longevity, regarded gotukola leaves as a favourite in their diet. This lead to the saying, 'two leaves a day, keeps old age away', probably even before the much quoted 'apple a day keeps the doctor away'. Even in Chinese medicine, it is regarded as the primary herb for promoting longevity, and is said that the legendary healer Li Ching Yun lived for 256 years as a result of drinking gotukola tea. Another legend says that tigers used to rub themselves with the plant to heal their scars, and indeed there must have been some truth in this, as today gotukola is intensively used in pharmaceutical preparations for the treatment of dermatological conditions including post operative scarring. The most widely known uses of this plant thus are for promoting longevity, increasing mental concentration and facilitating wound healing, although it is said to be effective in a whole gamut of medical conditions. It is thus interesting to delve into this plant in a simplistic manner, although there already is a plethora of information on it, to see what makes it what it is thought to be.

What is Gotukola?

Centella asiatica or Gotukola in Sinhala, Vallaarai in Tamil, belongs to the Apiaceae (Umbelliferae) family. In Sinhalese, gotu is translated as "conical shape" and kola as "leaf" It is known by a variety of names such as Indian pennywort, Asiatic pennywort, Marsh pennywort, Mandookparani (in Ayurveda medicine) and many others. In Sanskrit, and in Unani medicine, it is called Brahmi, meaning 'godlike', and is regarded in India as a spiritual herb. It is also sometimes confused with the dried cotyledon of *Cola nitidea* otherwise known as kola nuts, kola or cola. This is well known as an ingredient of coca cola, which contains up to 3.5 % caffeine, but which is not present in Gotukola. In India, the plant was somewhat confused for *Bacopa monnieri Wettst*, as both plants were sold under the name of Brahmi. However , this is now resolved and Brahni is *B.monnieri* and Mandookaparnie is *Centella asiatica*. Botanical synonyms include *Hydrocotyle asiatica* L. and *Trisanthus cochinchinensis* Lour.

In Sri Lanka In Sri Lanka there are two varieties of gotukola : the small leaf plant called Heen gotukola and the one with larger leaves, identified as Maha gotu kola. The former is usually used in Ayurveda medicine. The entire plant is beneficial, dried or fresh, and the root powder is taken, or the plant is sometimes dried and stored in an airtight glass bottle for use when required.

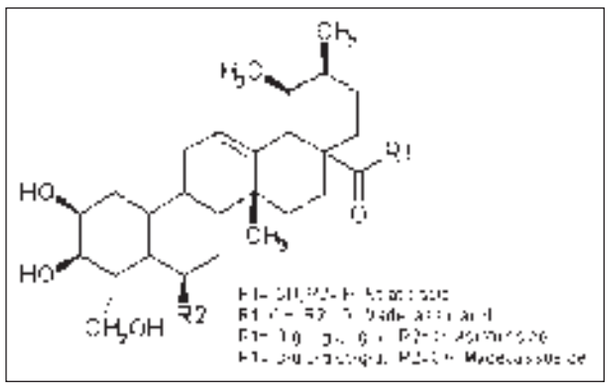
Centella asiatica is a slender prostrate herbaceous creeping plant, with stems being often reddish and striated rooting at the nodes. 1-3 leaves grow from each node, leaves being petioled and 2-6 cm long and 1.5 -5cm wide, circular reniform, broader than long, cupped, and with shallowly crenate margins. Flowers are in umbels with 3-4 white to purplish pink flowers from each umbel. Fruit is 4mm long, and is oval to globular in shape with thickened pericarp and often crowned by persistent petals. The plant grows on moist sandy or clayey soils, in dense clumps and is often seen as a green carpet and even as a weed in fields. Propagation is from seeds or stolons.

It is a native of South east Asia, India, Sri Lanka, Southern and middle Africa, parts of China, South America, Madagascar, some parts of US and Mexico. Four different chemical varieties are recognized, *Centella asiatica* from Madagascar, *Centella asiatica* from Ceylon, (Sri Lanka) and two varieties from India. The Indian and Sri Lankan plants have similar constituents while the Madagascan variety is a little different

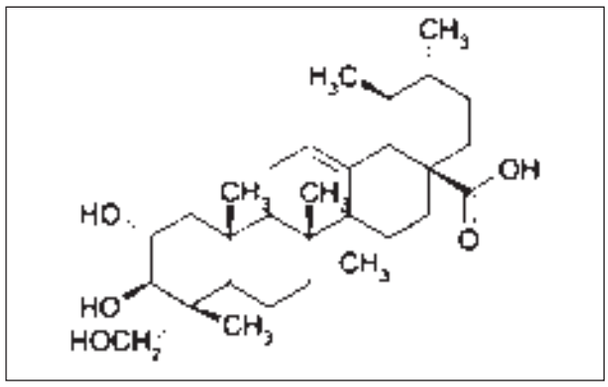
Chemical Composition

The chemistry of this plant has been intensively studied and is reported to have several compounds to which are attributed the many beneficial effects of this plant. These constituents of gotu kola have shown significant results in healing of skin, other connective tissues, lymph tissue, blood vessels and mucous membranes.

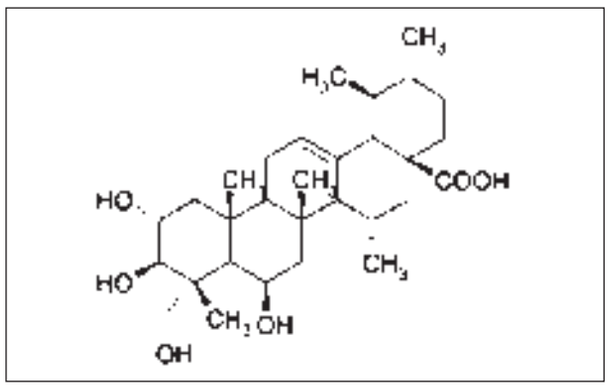
Several triterpene acids have been identified , the most significant as far as therapeutic value is concerned are, Asiatic acid and Madecassic acid (madegascaric acid-6-hydroxy Asiatic acid) derived from the triterpene saponins asiaticoside and madecassoside. The asiaticoside stimulates the formation of lipids and proteins for the production of collagen. It is also said to act as an antibiotic in the treatment of infections. The madecassoside is a glycoside with strong anti inflammatory properties and works with the asiaticoside to help promote skin healing, reduce the formation of skin tissue and relieve infections. It has been shown that, depending on the habitat, the saponins can be of two types, the more common one containing asiaticoside and madecassoside and the less common showing the additional presence of arabinose in the saponins thus forming Brahmoside and brahminoside.. These are diuretic in nature and have a slightly sedative action in large doses.



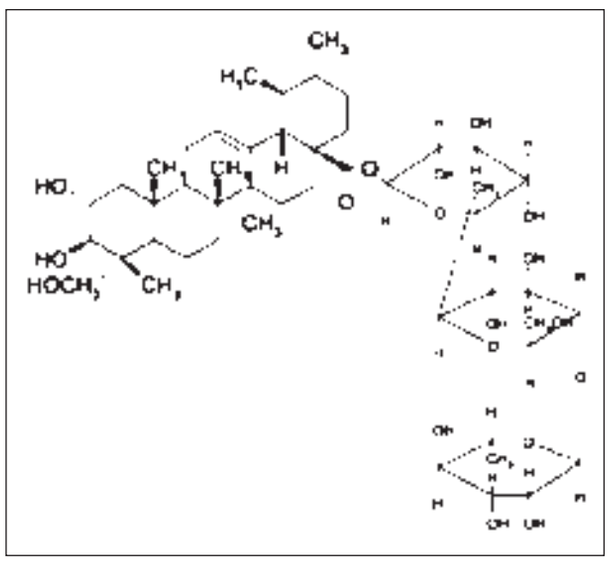
Asiatic Acid



Madecassic Acid



Triterpene Acids



Asiaticoside

The Indian and Ceylon plants have similar constituents with three triterpenic acids and centelloside similar but the Madagascan variety differs in its acid and ester.

Volatile and Fatty oils

The fatty oils present in the plant are glycerides of palimitic, stearic, lignoceric, olec, linoleic and linolenic acids.

Alkaloids

An alkaloid hydrocotylin (C22H33NO8) has been isolated from the dried plant.

Glycosides

The glycosides isolated from the plant are some of the most important constituents which exhibit much activity. Asiaticosides A an B , Madecassoside and Centelloside have been isolated and on hydrolysis yield the all important triterpene acids Asiatic, Madegascaric and Centellic acids. The first two acids are also present in the free form in the plants.

Other compounds

Flavonoids have been isolated from the leaves, and the plant has also shown the presence of mesoinositol, oligosaccharide centellose, kaempferol, quercetin, stigmasteroal, sitosterol, campesterol , polyacetylenes, carotenoids, vitamin B and vitamin C and also A G, and K and is high in Magnesium. Vellarine which is a bitter principle, pectin acid , tannins, sugars and inorganic acids are also present, as are amino acids, and inorganic elements such as iron, phosphate, calcium, sodium and potassium.

Medicinal uses

Tradition and folk lore play a major part in the use of this plant for medicinal purposes in different countries. For centuries, traditional healers -- most notably in China, India and Indonesia -- have used gotu kola to treat a wide array of illnesses and medical conditions . In other words they seem to have considered gotukola as being a panacea for all ills. Traditional uses include the healing of wounds, treatment of skin conditions such as leprosy and psoriasis, and improvement of cognitive function. Others have used the herbal remedy to treat such diverse ailments as syphilis, gastric ulcers, asthma, diarrhea, fever and hepatitis immune system deficiencies, circulatory problems, liver ailments, epilepsy, asthma and bronchitis, hair loss, tetanus, inflammation, rheumatism and intestinal complaints. However there is a dearth of clinical studies to support these claims. The most researched and established are its effects on longevity, senility and brain power, wound healing and circulation.

Brain food

There is an age old saying that an elephant never forgets, and many people may believe it, but do not know why. It is now postulated by the adherents of traditional medicine, that this may be because elephants eat the leaves of the gotukola plant. This plant has earned a traditional recognition among herbalists as being a "brain food" or "brain tonic" because of the effects it has on the brain. Some research points to it being actually beneficial in staving of senility and increasing concentration and memory power. It also is said to have a tranquillizing effect, having anti anxiety and anti stress effects, inducing calmness and a deep sense of relaxation during meditation. These effects are attributed to the presence of saponins - the most important being the asiaticosides , triterpene glycosides present in the leaves which are said to interact with the cholinergic neurosystem. People with stress related disorders like anxiety and panic attacks are believed to have an overactive startle response. Scientists theorise that the compounds in gotukolaa bind to receptors in the central nervous system and mitigate the startle response.

The memory enhancing effect is said to be associated with the increase of blood sugar levels caused by these compounds ,as, a relationship between hypoglycemia, or low blood sugar levels and mood swings, mental illness, fatigue, depression, confusion and schizophrenic tendencies, is well documented. Others postulate that the high concentration of B-complex vitamins (Gotukola is higher in the B-complex vitamin group than any other plant previously examined), could be a causative factor. B complex is necessary in providing energy for the body, by converting carbohydrates into glucose, a usable form of sugar for the body to burn. The B complex is responsible for the normal functioning of the nervous system as well.

Interestingly, in India, clinical tests have been carried out by researchers with a group of mentally deficient children, and it was found that with a daily intake of powdered gotukola, increased mental activity of the children was seen. After trials of three months, the children showed increased powers of attention and concentration, improved behavioural patterns and communication and significant increase in IQ, considerably above that of a placebo group of children.

In another study, again in India , in 1992 a study at Kasturba Medical College, it was shown that gotukola does offer support for healthy memory function. The tests showed an impressive improvement in memory in rats treated with a daily oral extract for some time before the experiment when compared to a control group of animals. It is believed that boosting circulation to the brain improves memory, and this

is what gotukola is said to be responsible for. Another Indian study showed that gotu kola extracts administered over a period of 42 months to normal healthy adults had several benefits: haemoglobin increased by a significant percent, and the mean levels of blood urea and serum acid phosphatase were decreased in addition to a steady increase in blood sugar levels.

However, much more intensive studies need to be carried out in order to substantiate these extravagant claims.

Wound healing

Incomplete and prolonged time for wound healing is a major problem encountered in surgical operations, problems which could even lead to amputation. The search to discover effective wound healing agents among the plant world has been on for some time. The quest met with some success when studies with gotukola were conducted. It was shown that gotukola was able to stimulate skin repair by producing healthy new connective tissue with increased tensile strength, including that of the skin, hair and nails. Gotukola also had the ability to promote fibroblast proliferation and collagen synthesis . This made it an effective tonic in skin diseases and leprosy, and particularly in wound healing. It is postulated that Asiaticoside may damage the cell walls of the bacteria that cause leprosy. The weakened bacteria are easier for the body's immune system to eliminate. Isolation of the active compounds have shown that the effective agent in this wound healing activity is the asiaticoside while the madecassoside complements this activity with its anti-inflammatory effects.

Venous deficiency

Venous deficiency occurs when valves in the veins that carry blood back to the heart are so weak or damaged that blood collects in the veins of the legs. This collection of blood can lead to varicose veins, spider veins or sores on the legs. A more serious outcome could be the formation of blood clots in the legs. Studies have shown that the asiaticosides and madecassoside present in gotukola may prevent, delay and treat this condition known as chronic venous insufficiency. These acids help keep veins and other blood vessels from leaking. Because it strengthens the walls of all blood vessels gotu kola may also be effective in slowing retinopathy, the gradual break down of the retina of the eyes. It can also relieve hemorrhoids. These same effects are thought to strengthen the lining of the gastrointestinal tract, making gotukola potentially useful for treating ulcers.

It is said that the total triterpene fraction of Centella asiatica (TFCA) is the causative factor which contributes to the overall beneficial effects of this plant

Cosmetic effects

The proven efficacy of the triterpene fraction of gotukola in healing and rejuvenating skin tissues has led to its incorporation in many skin preparations. The wound healing effects of this plant has the ability to ameliorate lines and wrinkles, which are the visible signs of ageing caused by the loss of elasticity of the skin tissues. Ageing of the skin has been attributed to the decrease in levels of type 1 collagen , the primary component of the skin dermis. Asiaticoside isolated from gotukola has been shown to induce type 1 collagen synthesis in human dermal fibroblast cells. Madecassic acid, asiaticoside and Asiatic acid act on fibroblasts cells and equilibrate collagen synthesis whenever it is modified. Overall contribution is its restoration of elastic connective tissue, reduction in fibrosis and shortening of time needed for wound healing. Most effects on collagen synthesis is proportional to administered dose. But its effect on cell proliferation is not recorded.

The Link Natural Cosmetic Range – Earth essence Cosmetics

Making use of the skin healing properties of the plant, Earth essence, the cosmetic brand of Link Natural, has a range of products with gotukola as a principal ingredient in soothing creams, and milks, regenerating creams, sun protection cream, hand lotions and special stretchmark and anti wrinkle creams. The main ingredients for the earth essence range of products are herbs and plants such as Gotukola, Turmeric, Sandalwood, Wel mee and Wenivel, which have long been proven to have health giving properties.

Gotukola use around the world

The Hosa and the Mfengu tribes in East Africa have used it for general health for many years. In the Philippines, the leaves are either consumed raw in salads or as a tea for tonic and stimulant benefits to the body. The leaves have been employed medicinally in the French West Indies, and

Brazil to cure uterine cancer, leprosy and elephantiasis. In the People's Republic of China, gotu kola is used for fevers, common cold influenza, sore throat and liver ailments such as cirrhosis and jaundice. In India, the plant has been used to treat skin inflammation, diabetes, cough, cataracts and other eye conditions, and to improve memory. In Europe, an infusion of the aerial parts of the plant was used to purify the blood and treat wounds, ulcers, skin inflammation, and hypertension. A similar infusion has been used in Indonesia and Brazil to help improve memory. In Malaysia, the plant was used to treat respiratory ailments, such as bronchitis and asthma, and stomach complaints, including dysentery, kidney trouble, inflammation of the urethra, and swelling. In Malaya, an infusion from this plant is sold as a tonic and cold beverage to treat liver ailments, tuberculosis, and blood in the urine. The leaves are pound into a paste to apply it to the body for fever. Malay mothers also used the herb to prevent and to reduce stretch marks caused by pregnancy. The herb also alleviates female conditions such as amenorrhea (absence of menstrual periods) and diseases of the genital and urinary systems. In the past, people in Japan valued the plant for its diuretic and detoxicant properties. In South China, the plant is used as a dietary supplement to promote health and immune system function. The common use in Sri Lanka will be dealt with presently.

Commercial Use

Gotukola capsules

Although initially used in the Asian region as a herbal medicine , the popularity of this plant has grown in leaps and bounds, and the Western region has now many commercial products using Gotukola as its base. This takes the form of creams, gels, ointments, lotions , infusions, teas, tablets and capsules. It is also used as an active ingredient in tonics , oral slimming formula, body beautiful preparations, body firming products, wound healing, and anti aging skin care products. Judging by the range and number of gotukola products available worldwide, the plant seems to have a lucrative market. *Centella asiatica* is marketed in the US under different trade names, such as Gota Cola, Gotu Cola and Fo-ti-tieng. These are body strengtheners and revitalizers that can promote longevity. in Europe they and are sold under such names as Madecassol and Centelase. Many of these products are standardized to asiaticoside content and commercial manufacturers havae numerous dosage regiments listed for their products. In the crude form dosages of gotukola range from 1.5 to 4 g/day.

Gotukola use in Sri Lanka

Traditionally, gotukola has been used for a whole host of ailment, without the added research knowledge that is available today. According to Aurvedic precepts which are held in much respect in the country, Gotu kola has a balancing effect on all three *doshas, vatha, pitta and kapha* which are the bio-energies of Ayurveda, and so the plant can be beneficial to just about anyone. In Sri Lanka , gotukola is used in a variety of ways

- As a food, Gotukola is commonly eaten as a salad, (Mallun), sambol and consumed with ground coconut and green chillies.

- As a 'kenda' or porridge known as Kola kenda, made with well boiled rice (with extra liquid), coconut nut milk, and pureed. This is good for sinus, phlegm, arthritis and is said to strengthen the immune system.

- As a beverage, gotukola infusions are said to improve circulation in the legs, and improves varicose veins and acts a soporific, to be effective in insomnia. Gotukola is also used as a tea both as a home brew as well as a commercially available preparation.

Link Gotukola Tea

- As a poultice on wounds or skin problems, the leaves can be crushed and applied as a tincture.

- As a treatment for sinusitis, the whole plant is boiled to make a decoction, a little pepper and sugar is added and administered for a few weeks.

- As a syrup, gotukola can be given for haemorrhoids and sinusitis. To make the syrup, the juice is extracted, and a little sugar is added. Also for haemorrhoids, gotukola can be boiled with small onions and kohila and drunk.

- As a decoction with valmi, can be taken for fever and dysentery.

- As a fresh juice, is also taken in cow's milk for rejuvenation. The juice is also taken to ease the passing of urine and to increase breast milk production.

- To improve general health, Gotukola is mixed with ginger and valmi powder and half teaspoon taken twice a day.

- As a paste with water, can be used to treat chronic external ulcers. The paste can be applied directly on the wound.

- For ascites (fluid in the abdomen), the gotukola is cooked with thampala leaves and eaten.

- To improve the voice of children, the leaf is chewed and the juice swallowed.

- As a vegetable, can be eaten to ease coughs and asthma along with red onions.

- As a brewed tea, is said to be a remedy for worms in children and enriches appetite. Also effective for those suffering from hay fever and catarrh. The tea can be prepared by drying the leaves, powdering it and storing in airtight jars.

Adverse effects

Neither topical nor oral gotu kola preparations are commonly associated with adverse reactions. In rare cases, headache, skin rash, and sensitivity to sunlight may develop. High doses may result in nausea.

No research has been done on the effect on young children, pregnant mothers and thus it is best that it should not be taken internally as a supplement by children under 4 or breast-feeding / pregnant mothers. People taking sedatives should also not use centella as a supplement. Excess ingestions could also increase blood sugar and raise cholesterol level. Being a very cooling herb the juice can cause dizziness due to lowered blood pressure when taken in excess.

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On Defeat.

Does a leaf when it falls from the tree in winter feel defeated by the cold? The tree says to the leaf:- " that is the cycle of life. You may think you are going to die but you live on in me. It's thanks to you that I am alive, because I can breathe. It's also thanks to you that I have felt loved because I was able to give shade to the weary traveller. Your sap in is my sap, we are one thing."

The Culture of Science

There is an increasing worldwide consensus on the vital importance of science for personal, social, economic and political development. This has spurred many countries to increase their investments in science and technology. But funding research is not enough. Nations must also promote cultures that celebrate science and its values of reasoning, openness, tolerance, and respect for evidence, just as they celebrate the arts and humanities, which enrich everyone's lives. Not only formal education but informal outreach is critical in achieving this goal.

John Durant and Alan Ibrahim in SCIENCE (2011) vol331, 11th March 2011.

On Adlai Stevenson.

What he left behind was something more splendid in a public man, than a record of power. It was simply an impression of goodness. He had mastered the art far more difficult and rarer than that of a successful politician, writer, musician, actor; success as a human being. Was he then too good to be a politician? Yes, in the sense of being too touchy to weather feuds and grievances, to gentle to take the rough and tumble

This courtly, twinkling, roly-poly, comical man, was of that estimable order, who left a lasting impression by the energy of their idealism, who were never quite strong or ruthless enough in the pit of the political jungle, and the critical relations of life to turn goodness or mercy into law or policy. Maybe it can never be done. At any rate Adlai Stevenson remains the liveliest reminder of our time that there are admirable reasons for failing to be president.

Alastair Cooke, in Adlai Stevenson, the Failed Saint. 1977

ASAFATOEDA - AN ENIGMATIC FLAVOUR, AND TRUSTED MEDICINE.

By R.O.B.Wijesekera

Preamble

Asafoetida, known in ancient times as "Hingu", is the gum exudate from the rhizome of the herbaceous plant, belonging to the Umbelliferae family, which is a native of the regions of Afghanistan and Iran.

Collecting of Asafatoeda gum resin in olden times in Iran

Asafoetida or Asafetida, is also the name given to the dried latex or oleogum, or oleoresin exuded from the tap-roots of perennial herbs belonging to many species of the genus Ferula, of the Umbelliferae family. The major source is *Ferula asafoetida*. Only the female pLant produces the latex which becomes asafoetida. The original geographical source of the species of plants is Europe, Northern Africa and central Asia, in particular Afghanistan, Iran, Syria, Turkey, and Westen Tibet. In India it is found at altitudes of 4000 metres above sea level in the dry valleys of Ladakh, in Kashmir, and Punjab.

The prized gum resin, from *Ferula asafatoeda* Linn, is used as a digestive aid, as a condiment in food preparations such as Asian curries, and in pickles. Its use as a medicament comes down from ancient times when it was employed in the treatment of nervous disorders, hysteria, bronchitis, whooping cough, pneumonia, and flatulant colics. It is a respected constituent in the therapies of ancient systems such as Ayurveda and Unani. It is known in India as "Hing", and also as "Deepniya" and as "sanjna-sthapakka" which literally means an apetiser and restorer of consciousness.

In Sri Lanka it is known as "Perunkayam", and is a constituent of curries, which include Dhal curry and the Sambar, a traditional preparation of the Tamil community. The article of commerce known as asafaetida, is the dried exudate obtained from the carrot-like tubers when sliced and allowed to drip. This is then powdered, or extracted with oil depending on the end use. The whole plant is used as a vegetable in the countries where it may be obtained in the raw state.

Asafoetida has a fetid odour which has caused it to be characterised as "devils dung". In the middle ages a small piece of the gum rolled into pea size was wrapped with a cloth and worn around the neck or arm to ward off evil effects and infectious diseases. The practice was common in Sri Lanka too during epidemics of measles, chicken pox and enteric.

Commercial asafoetida

Diagram of the Ferula plant

Traditional Medicinal Applications

There is evidence of the traditional use of the resin of asafoetida in several geographical regions of the world although the plant itself was located within the Middle Eastern region. This is indicative of its wide application in medicine and as a result its appeal as a product of trade.

In Afghanistan a hot water extract of the dried gum is dispensed to patients with whooping cough, and also as a treatment for hysteria and ulcers. As far off as China decoctions of the gum exudate is administered as an treatment for intestinal worm infestations, while a hot water extract of the dried root is administered as an anti-spasmodic, a diuretic and an analgesic in Egypt. In Malaysia the gum is chewed for amenorrhea. In Morocco it is used as an anti-epileptic, and in Nepal a water extract is administered orally as an anthelmintic. In Brazil the water extract of the dried leaf and stem of the plant forms the basis of an Aphrodisiac. Similar uses have been reported in other parts of the world and in the United States as well. In India it has been an integral component of traditional therapy for several millennia, as well as in the neighbouring regional countries such as Sri Lanka, Thailand, Burma and Pakistan.

The main recorded medicinal uses are as follows:

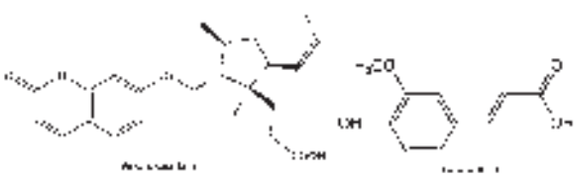
- Antispasmodic, anthelmintic, diuretic, expectorant, and laxative.
- Nerve tonic and aphrodisiac.
- Anti-malarial.
- Asthma, bronchitis, flatulence, infantile convulsions, colic.
- Anti-inflammatory, anti-pyretic,

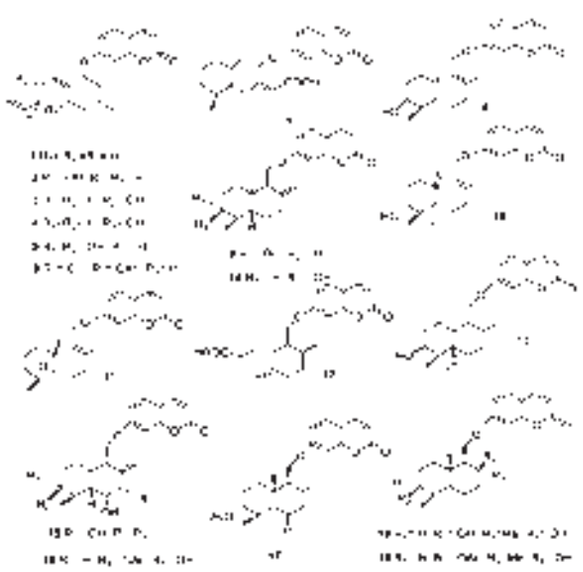
Modern research has found that asafoetida when taken internally is expelled from the body via the kidneys and the skin. It is also considered to promote urination and sweating. It has also an antifertility action and is so used in traditional medicine following childbirth.

Recent scientific research has indicated that asafoetida possesses several activities such as anti-oxidant, anti-viral, anti-fungal, cancer chemo-preventive, anti-diabetic, anti-spasmodic, hypotensive and molluscidal, which makes it a gold mine for future therapeutic developments and warrants a strong worldwide research thrust.

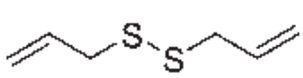
The Chemistry of Asafoetida

Asafoetida gum resin contains largely carbohydrates, around 70%, and the mineral content includes substantial amounts of calcium, besides iron and phosphorus. It also contains the vitamins carotene, riboflavin and niacin. The main organic constituents include: Ferulic acid, Ferulsinaic acid, Umbelliferone, and several sugars.





The disagreeable odour of the oil has been identified as mainly due to the secondary butyl propanyl disulphide, $C_{11}H_{20}S_2$, - and other di- allyl disulphides and tri sulphides, all being constituents of the essential oil obtained by steam distillation of the resin. For example:



Cultivation, and Processing of the Resin

The plant *Ferula asafoetida* is cultivated In the central European and Middle Eastern countries such as Afghanistan, Turkey and Iran and the gum exudate which is the main commercial product finds its way by the trade routes to many far reaching destinations. The female plant in the cultivation farms is found to generate sprouts and green foliage from the taproot just prior to the flowering season. The green foliage turns yellow within some weeks. This occurs after about four to five years from planting and at this stage the tap root is ready for tapping in order to collect the exuding latex. The massive carrot-shaped taproot by this stage has reached 12-15cm in girth when it is considered for tapping. A sharp cut with a knife is made in close proximity to the crown of the upper part of the roots. A milky juice oozes out of the cut and coagulates with time. After some days the coagulated matter is scraped off and a fresh cut is made in the root to collect a further supply of exudate. The procedure is continued repeatedly, until no further exudate emerges. The total yield of exudate is collected and stored in pits dug into the soil (approximately 2m square and 2.5m deep), and whose sides are lined with mud. The top of each pit is covered with stalks of the male plants. A small opening is left at the top to fill up with the daily collection of further solidified exudate. The semi-solidified asafoetida is a sticky mass which can be moulded by hand. It matures while stored in the pit and hardens somewhat with time.

On an average the yield of gum resin varies from 50g to 1kg per plant

The major processed products from asafoetida are:

- Oil of Asafoetida (the steam distilled essential oil)
- The solidified gum resin.
- Alcoholic extracts of the gum resin
- Compounded asafoetida

The oil of asafoetida has little commercial demand and is used for flavouring specialised oriental foods. The Flavour and Fragrance industries and the Pharmaceutical Industries use the purified alcoholic extract of the resin for their work and it is this product made from the solidified resin that has a demand in this sector. Compounded asafoetida is composed of the gum resin collected from several sources mixed with gum Arabic or starch or edible cereal flour in a ready-to-use preparation. This form is specially formulated for direct use in cooking as the natural form is too strong to be so used. The blending formula of these compounded asafoetida preparations are trade secrets of the respective manufacturers.

Concluding Observations

The resin asafoetida is a classical component of traditional medicines as well as traditional cuisines. Its medicinal use is wide and varied and some of the uses have had scientific evidence behind it although not clinical evidence yet. The mythological belief is assigned to the suspicion that its fetid odour is hostile to germs and would be a deterrent. The shock of its sharp smell was believed to be the cause of its effect in calming hysteria. However present views contend that it is a potent antioxidant, and a component of the resin, ferulic acid, has shown promise as a chemo-preventive agent against carcinogenesis. Studies have shown some cytotoxicity against tumour cells and human lymphocytes. Antispasmodic and hypotensive activity has been demonstrated in animal experiments and anti-viral activity of the variety of sesquiterpenoids present in asafoetida has been demonstrated in vitro against the influenza A virus H1N1.

In the flavour field it is still valued in eastern cuisine and even in the sophisticated French cuisine it is selectively used by chefs to bring in exotic characteristics to foods. A historically valued medicine with a daring array of properties, is slowly giving up its secrets to scientific investigation.

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I have a theory that scientists and philosophers are sublimated romanticists who channel their passions in another direction This theory fitted well with the personality of Einstein, a typical Alpine German in the nicest sense, jovial and friendly. And although his manner was calm and gentle, I felt it concealed a highly emotional temperament and that from this source came his extraordinary intellectual energy.

Charlie Chaplin- his autobiography.

ESSENTIAL OILS IN PEST MANAGEMENT

By R.O.B.Wijesekera

Preamble

The ancient practice, of utilizing essential oils to keep away pests in households, and in agricultural crops was common to the Persian, the Egyptian, the Chinese, and the Indian civilizations, as well as the Mayas and the Incas. Now in recent times this ancient practice is being resurrected. Synthetic chemical pesticides have played a major role in modern times in securing food supplies, and combating health hazards. However, due to excessive use and consequent environmental problems, effects on human wellbeing and resistance among pests to the chemicals, the search is on for better alternatives. This includes alternatives for the pesticides we use in our homes and gardens, the repellents and other pesticides used in agriculture and crop production, as well as the pest repellents that we have to employ to safeguard ourselves, as well as those pesticides that are used to prevent our stored foods from destruction. We are compelled to use them because they are toxic to the creatures that we consider pests; and who, so to say, bug us, and interfere with our own lifestyles. But it must be accepted that these same chemicals are toxic to us too. Not always will the toxicity manifest itself instantly, though sometimes we may feel nauseous or get a mild headache. Of times the toxicity manifests itself in a belated manner in the form of allergies, chronic ailments, and in time even producing reactions in our internal organs.

It is estimated that around 2.5 million tons of pesticides are used on crops alone each year. The worldwide damage caused by pesticides is reckoned on a modest scale to be around 100 billion US dollars annually. There are two principal reasons for pesticide damage to humans. They are:

Citronella grass (Cymbopogon nardus)

- The pesticides generally employed have a high relative toxicity and they are not bio-degradable so their effect lingers.
- The residues remain in the soil, water resources, and enter edible crops that affect public health.

Thus there is a dire need to research for pesticides that are selective, biodegradable, and are relatively environment friendly.

In normal life, plant products are used in many forms for foods, as medicines and even in the management of pests and insects that are troublesome to humans. For example, in Sri Lanka maana grass, - the parent grass from which grew citronella grass, - which latter, now grows wild in the hill country, has been used to control mosquitoes. From this well established practice emerged the use of citronella grass, and later citronella oil, as a mosquito repellent. The use of plant material in pest control, declined in modern times, with the introduction of chemical products on an industrial scale. These had become readily accessible and were thus comparatively more convenient to employ. In spite of the present widespread concern for the long term health and environmental effects of synthetic pesticides, natural pesticides both of microbial and plant origin have had, up until now, little impact in the marketplace.

Bio-insecticides, dominated by those based on *Baccilus thuriegiensis*, and the so-called botanical insecticides, - largely pyrethrum based products, - account for less than 1% of the current global market. However recent legislative interventions in the USA, and in Europe, are bound to influence use

of conventional cheaper chemical insecticides, and will open a wide market opportunity, for safer plant based products.

Essential oils are the primary plant based products that possess properties for wider reaching use as insecticides, pesticides and agents that repel or exterminate pests, without harming the atmosphere and rendering it unsafe for humans and domestic pests. New studies are emerging that zero in on essential oils as a potential source of acceptable pest management agents.

Scientifically it is known that essential oils are lipophilic in nature and interfere with the basic functions of insects namely, their metabolic, biochemical, and physiological functions and behavioral patterns. Thus essential oils and their constituents can now be seen as an alternative means of controlling many insect types.

A New Unique Industrial Opportunity

The stage seems set for the Essential Oils industry in both developing and developed countries, to make good use of the market opportunities that can arise from the present global scenario. There is a compelling need for insect repellents and insecticides given the increase in viral diseases, insect borne diseases like malaria, and in the food industry, the need for protection of valuable grain which is subject to pest destruction.

Essential oils obtained by steam distillation, and even the raw plant material itself, have both been traditionally employed in the control of pests and in the protection of stored grain and legumes, and to repel flying insect pests in the home environment. For instance stored rice was kept free from insects by using citrus leaves, bay leaves, or cinnamon leaves, which were placed in the storage vessel and replenished with fresh replacements on a regular basis. A host of relatively primitive preparations are seen in the market places of many countries, yet the claims of these have to be scientifically substantiated. The picture that emerges is clear. Essential oils and their chemical constituents do possess scientifically demonstrable contact as well as fumigant toxicity to a number of pests as well as to plant pathogenic fungi. One could say that plants in nature have evolved to disperse their own metabolites so as to combat pests that may be detrimental to their own well-being. This is nature's way to guard against elimination of the species and is part of natural ecology. This explains why some plant species do not thrive when taken out of its natural habitat and placed where new predators exist. Thus plants do contain secondary metabolites that possess anti pest properties.

Marigold flowers – a natural pest repellent

Essential oils themselves, when they are obtained as commercial products are generally the steam distilled product derived from the aromatic plant part of a select species. This is widely varied and may range from any of the following: the flowers, fruits, berries, buds, barks, rhizomes, roots, leaves, heartwood, gum exudate, and sometimes the entire aerial plant. There is such a variety, and there are so many aromatic essential oil generating plants, many of them indigenous to the tropical regions. This implies that by scientific selection an effective preparation for insect or pest control could be made, in a variety of different preparations, as suitable to apply to any specific situation, in any given region. These preparations should comply with the requirements of efficacy as well as economics.

Recent research has demonstrated that essential oils possessed the following actions with regard to insect pests that could be used in developing new pest management agents.

- Larvicidal activity.
- Antifeedant activity
- Capacity to delay development, adult emergence, and lowered fertility.
- Repellent activity
- Pesticidal activity

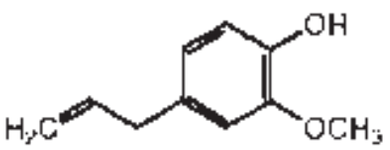
These properties are quite promising but there are others which are negative with respect to usage as pest control agents. These are:

- Their high volatility and labile nature
- Ease of oxidative degradation
- Relatively poor solubility in water.
- Limited staying power in the applied location

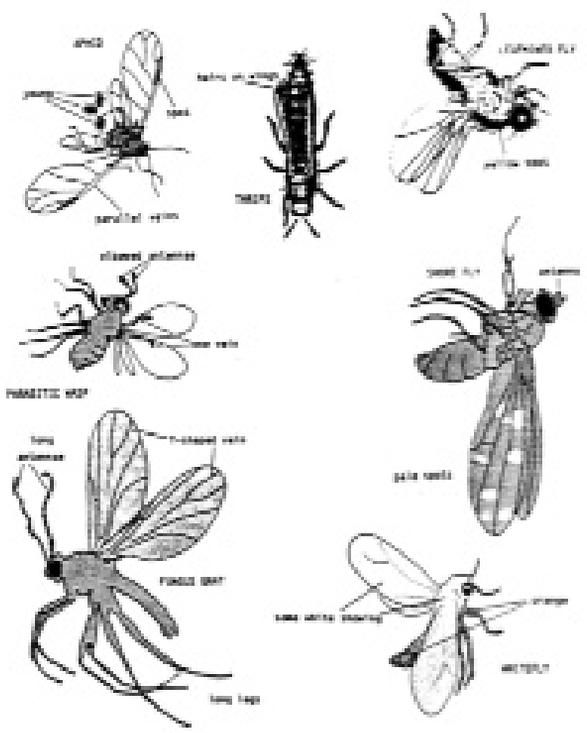
In the development of commercially viable agents the above factors have to be considered as well as the efficacy, safety and economy of the possible agents.

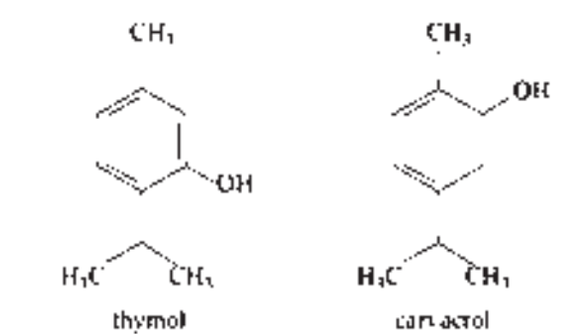
Contact and Fumigant Action

The contact and fumigant actions of essential oils have now been well demonstrated against stored food grain pests. For example, among several essential oils tested against the bean weevil that is *Acanthosceledes obtechtus,* the essential oils of *Thymus serpyllum,* rich in the phenolic compounds, such as thymol and cavacrol, were the most effective. Similarly it has been found that essential oils containing other phenolic substances such as eugenol, were effective in pests of stored grain. In the relevant study clove oil was used, but cinnamon leaf oil is a cheaper source of eugenol, and is readily available in a country such as Sri Lanka as a by-product of the cinnamon industry.



Eugenol



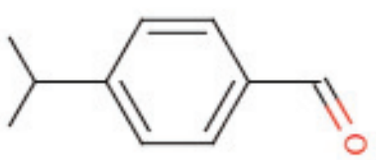


thymol

Essential oil burner for fumigation

Phenolic substances, and essential oils containing them, would be ideally suitable candidates for the formulation of pest management preparations. The constituents from essential oils are volatile and have the advantage that they will not linger unnecessarily for too long in the environment.

Researcher Shaaya and their team, have recently evaluated the fumigant toxicity of over twenty varied essential oils and their major constituents, against four different stored product coleopterans, and all the substances were almost equally active against these pests. In other words, all these substances were toxic to a broad spectrum of pests making them suitable for effective and economic formulation. Recent studies have also confirmed the efficacy of certain essential oils on plant pests. The essential oils derived from Cumin *(Cuminium cyminium),* Anise, *(Pimpinella anisum), Oregano, (Oreganum syriacum* var. bevanii) and *Eucalyptus dulensis,* were effective against two common greenhouse pests.



Cuminaldehyde

Cumin seeds

Researchers have also recently reported the toxicity of essential oils of Basil, *(Ocimum basilicum)*, against garden pests and a range of essential oil constituents on the western corn rootworm, *(Diabrotica virgifera)*, the two spotted spider

mite, *(Tetrany chusarticae)*, and most significantly the common house fly *(Musca domestica)*. Also recently recorded are the effects of certain monoterpenoid constituents of essential oils on the European corn borer, *(Ostrinia nubilalis)*, and certain essential oils and their constituents on the echto-parasite of the honey bee *Varoa jacobsonii*.

The antifungal effects of essential oils were noted by researchers in the last decades of the twentieth century. Screenings have been recorded in the 1980's by researchers, against food spoilage organisms including both human and plant pathogenic types. Later several workers have screened essential oils and isolated components, against the fruit pathogen *Botrytis cinerea* and recorded that the antifungal activity was strongly associated with the monoterpenoid phenols especially: thymol, carvacrol, and eugenol. Anti-nematode activity has also been associated with eugenol in another study. Eugenol is a component of cinnamon leaf oil, which is a major by product of the cinnamon industry.

The volatile oils of plants and some of their constituents have been mentioned as containing substances which inhibit or interfere with virus attack. The essential oil of *Melaleuca alternifolia, Ocimum basilicum,* and several other oils have displayed inhibitory activity against common plant viruses including one which attacks the Mung bean.

Essential Oil as Green Pest Management Agents

The ready availability of several essential oils, their wide use in traditional preparations, as well as their extensive use in the modern flavor and fragrance industry, make them free from the stringent regulatory requirements that would apply as in the instance of synthetic pesticide agents. Their safety in use seems already established. The one factor that may hinder its wide usage as "green agents" for pest management would be based on economic factors. Synthetic agents are relatively speaking cheaper and more easily available to be used in the formulation of pest control agents. Natural product derived agents though are relatively expensive as they are based on plants, generally cultivated species, and though they are widely available in the tropical and sub-tropical regions, they are based on labor-intensive operations. However the long-term need for suitable environment-friendly agents makes the use of essential oils in formulation of a new generation of green agents for pest management an attractive research and commercial proposition. The concept of "Green Pest-Management agents" can be defined as:

"Those agents that are as well as the natural product derived and can contribute towards the management of the pest populations in order to increase food production and food storage, reduction of pest infestations that are harmful to human wellbeing and health. They should be eco-friendly, and while being effective in the control of pests be completely safe towards the health of humans and domestic pets."

In this context essential oils have been good candidates to serve as formulated green pest-management agents, and some recent examples of their commercialization will now be considered.

New commercial prospects:
"Green Agents" for pest- management.

Essential oils are the volatile secondary metabolites of plants that have through the years become famous for their flavor and fragrance characteristics; as such they form a major resource for the International Flavour and Fragrance Industry. They are found in nature within glandular hairs or secretary cavities of plant cell walls, and are present as droplets in the leaves, flowers, stems, barks, fruits, berries, seeds, even the heartwood of a wide variety of plant species. The volatile aromatic nature of essential oils, perform specific functions for the plant itself namely:

- Attracting, or as the case may be repelling pests.
- Providing protection from extremes of temperature.
- Providing a defense against hostile insects or other creatures.

The quantity of essential oils found in plants varies greatly. Those that have their essential oils in the leaves such as the ocimum species or the grasses such as citronella, have a content of 1-2% but others such as cinnamon bark ,vetiver roots, and sandalwood are scarce. The content therefore, ranges from 0.01 to as much as 10%.

The wide range of constituents of essential oils, form a palette of compounds that derive from the chemical class known as the "terpenoids". They are mostly esters, alcohols, phenols, ethers, related to mono-terpenoids with ten carbon-atom scaffolds, and sequiterpenoids containing fifteen carbon- atom scaffolds. In some oils one or two major compounds are found. Cinnamon oil has cinnamaldehyde and eugenol. Cardamom oil has cineole and alpha-terpenyl acetate. Coriander oil has predominantly Linalool, and linalyl acetate, and basil oil has methyl chavicol. However the respective quantity and the natural blend of these terpenoid constituents form the characteristic aroma associated with each oil. It is this natural blend that cannot be exactly reproduced. With remarkably few exceptions the essential oils and their constituent major compounds are non-toxic to mammals.

This makes them eminently suitable for their current role in fragrances, flavours, cosmetics and spa products, and similarly they would be ideal candidates to be used as agents for pest management. One drawback, as noted before, would be their limited persistency under the severe field conditions which is a factor of their volatility. For example, when applied to a crop a preparation with essential oils may be initially effective but pests reinvading the site may not be affected to the same extent as with regular pest-control agents. Effects under field conditions have still to be evaluated. But the following fact is noteworthy. In the Fundelea farm in Rumania, one had witnessed that they were utilizing intercropping with aromatic plants such as mint and coriander, alongside others as a means of controlling pests and by judicious choice of the plant species were able to manage pest control. This technique is now well developed and identified as "trap cropping" where a resilient crop is planted as a buffer crop to one that is sensitive to pest attack.

An example of Trap Cropping.

There are several essential oils of which there is evidence of pest management potential. Lemon grass, Citronella grass, Eucalyptus leaves, Vetiver roots, clove buds, Cinnamon leaves, Bay leaves, and Thyme, generate oils that are known for their pest control properties. Oil of peppermint is known to repel ants, flies, lice, and moths. *Artemesia annua,* derived from the Chinese plant locally called Qinghasu is currently the well-established mosquito repellent. Other species such as the Maleleuca spp, Ocimum sp., Pelargonium spp., are known to generate oils effective against insects and fungal pathogens.

Citronella oil has a history of use as a mosquito repellent. A combination of a few drops each of citronella, lemon grass, lavender, basil and rose oils, in a liter of water has been successfully used to ward off insect pests. The oil from vetiver roots which contain several oxygenated sesquiterpenoid components has been known to ward off insect pests, particularly silverfish that attack paper and books. Dried roots of vetiver when placed in closets, book cupboards, drawers, and chests and have proved their efficacy in ancient temples and monasteries.

The mosquito repellent activity of over thirty essential oils has been evaluated against the Culex species and also against A.aegyptae. The oils of citronella, patchouli, clove, were found effective and provided almost two hours of complete repellency. Among the essential oil constituents, namely Eugenol, Cineole, and Citronellal tested, Citronellal was found to be the most effective against *A.aegyptae* mosquito Recently, it has been revealed that the essential oil of Catnip – *Nepetia cateria*, is very effective in repelling mosquitoes, bees, and other flying insects. The effective constituent is identified as Nepetalactone, reckoned to be far more effective than the conventional DEET. It is particularly effective against the mosquito which is a vector for yellow fever virus.

Several essential oils have been shown recently to possess commendable larvicidal activity and their use in this capacity is of considerable practical interest.

Of the constituents of essential oils it has been found that the substituted phenols such as eugenol, safrole, isoeugenol, isosafrole, are better toxicant and repellents than the monoterpenes.

The constituents of the Sri Lanka Betel leaf which contains the phenolic substances, Safrol, Chavicol and Chavibitol have also been shown to possess larvicidal properties on several insect types by Arambewela and her collaborators . Mohottalage and his team found betel to possess considerable activity against the common house fly Musca domestica. The common housefly in tropical climates is a carrier of germs that effect foods of all types and control of this pest with a natural non-toxic agent will be an important aspect of healthcare.

Exhaustive scientific studies by Arambewela and collaborators have shown that the essential oils of a variety of betel types cultivated in Sri Lanka are compelling prospects for use as insect control agents in view of their efficacy as larvicides. The studies covered the larvicidal effects on the house fly, the mosquito, and the lavae of two Chrysomya species. These workers have also indicated the effectiveness of betel essential oil in the control of the rice weevil. The major compounds safrole, chavibitol acetate, were found to be at a maximum at the harvesting time. Based on the evidence of their work, this seems to be a commendable prospect for industrialists in Sri Lanka, where betel is cultivated for cultural reasons as well as for export as a subsidiary crop within the plantation sector.

Monoterpenes being more volatile however, are more useful as insect fumigants, or sprays. Pulegone, Linalool and Limonene, are known as effective fumigants against the rice weevil. Limonene is a constituent of the leaves of the citrus species and this justifies the traditional use of orange or lime leaves as an insect repellent for stored rice. *Mentha citrata* oil which contains both Linalool and the acetate is also an effective fumigant against the rice Weevil.

Essential oils and constituents have also demonstrated activities such as anti-feedants. This means that there is a repellent activity without direct contact to the insect, or suppressant or deterrent from feeding once contact has been made.

Cinnamaldehyde, Eugenol, Cinnamyl acetate and the essential oils from the Cinnamomum species have been noted to possess decided larvicidal properties. There is much evidence to indicate that selected essential oils and their constituents could play a major role in the control of mosquito-driven malaria and dengue fevers.

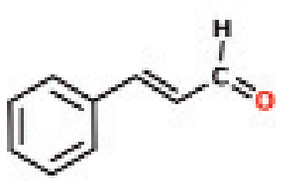
Commercial prospects.

There is little doubt that there is considerable evidence of the potential of essential oils in the development of suitable eco-friendly agents for pest management, but in the context it is surprising how few products have currently reached the market place. Regulatory barriers cannot now be the reason. In the US commercial development should have been greatly facilitated by the exemption from registration for certain oils commonly used in the food and beverages industry. This initiative has indeed given an impetus for the development of essential oil based insecticides, fungicides and herbicides for industrial and agricultural use. The products thus far developed use thyme oil, rosemary oil and clove oil. Consumer interest in these products has been considerable in particular for the control and management of greenhouse pests as well as for domestic pest management. One fungicide utilizes cinnamon oil and is used for horticulture and the management of fruit crops.

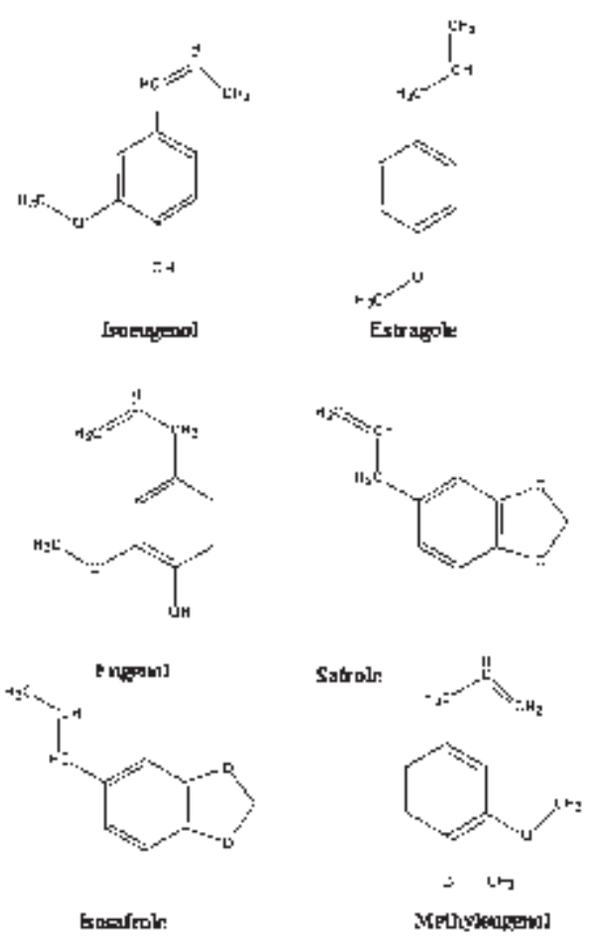
Cinnamon oil is reckoned to show promise as a great-smelling environmentally friendly pesticide with the ability to destroy mosquito larvae even better than the usually used DEET according to a new study. The researchers also expect it to be a good mosquito repellent. This study conducted by Peter Shang-Tzen Chang at the National Taiwan University, tested eleven constituents of cinnamon leaf oil for their ability to kill emerging larvae of the mosquito that carries the yellow

fever vector, *Aedes aegyptii*. Of the constituent compounds cinnamaldehyde rated higher than the rest even more than the DEET that is now commercially used. Eugenol is another component of cinnamon leaf oil which according to recent studies has displayed efficacy as a fast acting contact insecticide on a wide variety of household pests such as cockroaches, ants, flies dust mites, wasps, spiders and fleas.

Larvicidal activity is judged by a measurement termed LC 50. This is the concentration of the preparation that will kill 50% of the mosquito larvae within a twenty four hour period. Accordingly a lower LC value will translate into a higher level of activity, because it takes a lower concentration to kill larvae in the same period of time. Cinnamaldehyde had the strongest activity among the compounds tested by Chang with an LC 50 of 29ppm. As a comparison the LC 50 of the popular DEET is more than 50ppm.



The studies of Arambewela et al. have clearly established the efficacy of betel leaf essential oil as a larvicidal agent with prospects for use in preparations to combat the mosquito, the house fly, and larvae of similar pests.



Several others that are deemed ecofriendly are slowly reaching the market as the ingredients used are approved as food additives and classified as GRAS or Generally Regarded As Safe by the Food and Drugs Administration of the US.

Garlic based pest management products have also appeared in the market place and it would appear that the use of essential oils as safe and approved pest management strategy is gaining momentum as well as commercial favour. Studies are also available that indicates the value of Eucalyptus essential oils as a natural pesticide. It is also reckoned to be toxic to microbes, bacteria and fungi. Thus it has a role to play in the protection of crops against molds, mildew and wood rot fungi.

The benefit of using essential oils as against single component chemical pest repellents is that conceivably they work within a plant and is unlikely to become resistant to the pests.

Several new technologies of formulation are also currently been developed to enhance the effect of essential oils based products. A product developed in Italy containing thymol, with small quantities of cineole, menthol, and camphor, has been used to control Varo mites in honey bees. Tagetes patula is the botanical name of the popular flower known as Marigold and beloved of gardeners in Europe. Researchers in the De Montfort University at Leicester have noted the ability of this plant to destroy attackers beneath the soil. It is this property that could be the key to organic renewable and cost-effective pest management, say the researchers that could be harnessed to protect crops.

Based on research at the Ben Gurion University of the Negev a slow release technology for essential oils has been developed to make relatively eco-friendly pest control agents. The company has developed a patented technology for the gradual release of essential oils from a formulated pest control preparation. Also being developed is another new technology using oil-in-water micro emulsions as a nano-pesticide delivery system to replace the traditional emulsifiable concentrates (oil). It is believed that the advantage of using pesticide oil-in-water micro emulsions will improve the biological efficacy and will reduce the required dosage.

Such new innovative technologies will form the basis of a paradigm change to enable green pest management to enter as a major player in the battle against harmful pests.

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AROMATHERAPY FOR SELF CARE

By Doreen Petersen *

Responding to stress is something people naturally do to help regulate the body – but staying in a constant state of stress will eventually have negative effects on health,. Cortisol, also called the stress hormone is part of the body's natural response to stress , but when released at high levels or when it is not allowed to disperse due to chronic stress, it can decrease immunity, bone density and overall quality of life.

Practicing consistent and intentional self care to support the body's natural relaxation response to keep our body's cortisol levels balanced and healthy, is essential for long term wellness,. Aromatherapy is one effective self care method we can use to stop stress from taking root in our body.

Aromatherapy triggers the relaxation response necessary for self care. The relaxation response can be triggered by doing something you like such as deep breathing, walking, and self massage. Triggering the relaxation response has many health benefits, including healthy cortisol levels and decreased heart rate, decreased blood pressure, improved digestion and normalized blood sugar levels.

Aromatherapy is flexible and portable and can be squeezed into your busy schedule of a normal working day. Consider using essential oils as part of your everyday health routine. Using essential oils when when you are already relaxed such as during a massage, creates a positive conditioning response.

To support everyday use, try inhalation of single essential oils,, or if you have more time, create a personal blend of essential oils. Both methods have therapeutic properties If you use inhalation choose essential oils with a pleasant association Waft or (diffuse) calming, yet uplifting aromas like Palmarosa, *Cymbopogon maritini, Neroli, Citrus aurentium* var amara, or Bergamot *Citrus auretium* var bergamia. Inhale deeply.

If you choose to make a blend, select essential oils with relaxing and uplifting properties. Anise *Pimpinella anisum,* Basil, *Ocimum basilicum,* Clary sage *Salvia schlarea,* Geranium *Pelargonium graveolens,* Grapefruit *Citaus paradisi,* Lavender *Lavandula angustifolia,* Nutmeg, *Myristica fragrans,* Petitgrain *Citrus aurantium,* Rose attar, *Rosa damascena,* Rosemary *Rosmarinus officinalis,* Sweet orange *Citrus sinensis,* Tangerine, *Citrus reticulata*, and Ylang ylang *Cananga odorata* are especially useful useful for stress reducing blends.

For a stress relieving shower, combine 4 ounces of unscented shower gel, 15 drops of Rosemary, 10 drops of Grapefruit, 10 drops of Tangerine, and 6 drops of Petitgrain. Use externally.

For a more sedating blend, for massage or bath, combine one half cup of Sweet almond oil, 6 drops of Anise, 6 drops of Rose attar, and 6 drops of nutmeg. Use as needed as a massage oil.

Note that you can use essential oil blends in a diffuser. Simply leave out the base oil or gel.

* *Doreen Peterson is President of the American College of Healthcare Sciences*

http://www.massagemag.com/News/printthis.php

THE BENEFICIAL EFFECTS OF WINES

By Kiran

The secret of l' eau de vie" & a "French Paradox"

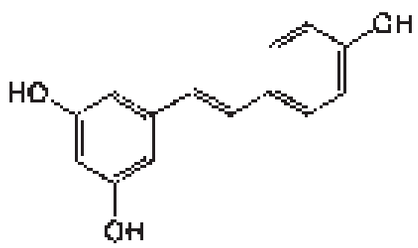
L' eau de vie in French translates to mean the "water of life" and is the expression that is often used to describe wines, which are culturally the "life blood" of European society. Royalty in Europe throughout the ages since Roman times, feasted on wines and good food. Tendering of vineyards and production of wine that is now termed viticulture is therefore an old art that even perhaps pre-dated the fabled Roman era. It is even today a foremost agro- industry in Europe extending from western, central, and on to Eastern Europe, through Spain, Portugal and France, through Iran and Turkey, to eastern European countries such as Hungary, Romania, Georgia, and Russia. Wine, a classical phyto-product, is culturally a most popular drink and is always associated with good food. The technology of viticulture is now firmly ensconced also in the USA, Australia, South Africa, New Zealand, the South American countries, such as Chile, Argentina and Brazil, and many other parts of the world. Wine has become now a part of Global social culture and an accompaniment to cuisine.

A vineyard in Bordeaux, France.

Wine comes from grapes, a fruit of the species Vitis, of the botanical family Vitaceae. In the modern context, grapes are harvested into baskets and then cast into waiting trucks leading to a central location where they are pressed to squeeze out the sugary juice. The juice is decanted at which stage it is a sweet drink, called in German "most". When allowed to slightly ferment it is termed in German "spurm". The spurm is stored in vats and in time there is the fully matured wine the prized drink of the opulent societies. The wines are labelled according to the names of the particular grapes used. Recently, many health attributes have been associated with

wines, chiefly its beneficial effects in countering the symptoms of ageing and related diseases like heart disease and stroke. These effects are attributed by modern scientific research to a special constituent in wines called Resveratrol. Resveratrol belongs to a class of polyphenolic chemical compounds, generally called stilbenes. Scientific interest in the compound resveratrol came as a result of its presence in red wines and the epidemiological information that those who consumed red wines were less prone to cardiovascular diseases. It was felt that resveratrol was the explanation to what was termed the "French Paradox". This is the observation that mortality from coronary heart disease is relatively low in France despite comparatively high levels of saturated fats in the diet, coupled with the habit of smoking. This led to the belief that regular consumption of red wine could provide protection from cardiovascular diseases.

Red wine generally produced from red grapes contains resveratrol and also high amounts of a range of other polyphenols which have proven antioxidant effects. Wines produced from other grapes such as white wines, and Rose wines, have resveratrol in lesser quantity. Furthermore, significant reduction in cardiovascular disease risks, have been associated in general with moderate consumption of alcoholic beverages. However it is not yet convincingly clear if the consumption of red wine and its content of polyphenols including resveratrol, give added protection beyond its alcohol content. Studies of an epidemiological nature in this regard have not been conclusive. Some studies, for instance, have found wine drinkers were at lower risk than beer drinkers and those indulging in other liquors. Others found no significant difference. However a placebo controlled human study has found that heart disease patients administered red grape polyphenol extract, experienced acute improvements in endothelial function.



Chemical structure of Resveratrol

Therefore the mystery of the French Paradox remains. Studies have found that in France those who prefer wine had higher incomes, more education and smoked less, and consumed more fruits and vegetables, and less fatty foods than those who preferred other alcoholic beverages and this complicates the issue further. As a result of the research conducted recently there is room for optimism. Polyphenols and resveratrol too are found in several sources that include the skins of red grapes, many types of berries, and certain other fruits as well. Experiments on mice have shown that resveratrol may have a number of heart healthy benefits, such as preventing damage to blood vessels, decreasing clots, lowering cholesterol, hindering inflammation, and warding off stroke.

An assortment of berries

Some of the most searching research however is focussed on its potential as a general anti-ageing agent. New research seems to confirm the theory that resveratrol by stimulating the cellular proteins, known as sirtuins, is able to promote longer cell life in the body. The new findings by a group led by David Sinclair of the Harvard Medical School, and a member of the team that in 2003 discovered the effect on sirtuins, observed that resveratrol stimulated proteins directly. It specifically appeared to help increase the activity of mitochondria, which produces energy within cells thus extending their lives. Sinclair revealed in a statement that now they knew how resveratrol works. A new study is believed to be conclusive in putting an end to conjecture as regards resveratrol's means of imbuing beneficial health effects. In 2012 the US National Institute of Health issued a statement that researchers had pinpointed the mechanism of action by which resveratrol promotes health. This knowledge could also give rise to new methods for treatment of heart disease, Type 2 diabetes and Alzheimer's disease. The principle scientist heading this study was Jay H. Chang, Chief of the Laboratory of Obesity and Ageing Research at the NIH's National Heart, Lung, and Blood Institute. Dr Chang had been researching Resveratrol for over five years. He is quoted as saying: "It captivated my interest because a simple naturally occurring compound was able to mimic certain healthful aspects of calorie restriction." Dr Chang and his collaborators have presented evidence that resveratrol does not directly activate sirtuin 1, a protein associated with ageing. They contend that resveratrol inhibits certain types of proteins known as phosphodiesterases, (PDE's) enzymes that help regulate cell energy. Chang and his team had in earlier work established that resveratrol could not be interacting directly with sirtuin 1, because resveratrol activity required another protein enzyme which starts a chain reaction that results in the activation of the sirtuins. Dr Chang will be testing these hypotheses with clinical trials.

This is a hopeful indication for the future in respect of anti-ageing?

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RESEARCH/
REVIEWS

A REVIEW OF THE PHARMACOLOGICAL AND TOXICOLOGICAL PROPERTIES OF *TRICHOSANTHES CUCUMERINA* LINN OF SRI LANKAN ORIGIN

By Ira Thabrew , Menuka Arawwawala** & Lakshmi Arambewela*

Introduction

Trichosanthes cucumerina Linn. (Fig. 1) is an annual, dioecious climber belonging to the family Cucurbitaceae. It is widely distributed in Asian countries including Sri Lanka, India, Malay Penisula, Thailand and Philippine. The whole plant including roots, leaves, fruits, seeds have medicinal properties. The root is used as a cure for bronchitis, headache and boils. Externally, the leaf juice is rubbed over the liver to relieve liver congestion. Both the root and fruit are considered to be cathartic. The fruit is used as an anthelmintic in French Guiana. The seeds are used for stomach disorders in Malabar Coast and are also considered antifebrile and anthelmintic. The aerial parts of *T. cucumerina* are used along with other plant materials for indigestion, bilious fevers, boils, sores, skin eruptions such as urticaria, eczema, dermatitis, psoriasis diabetes and ulcers1,2.

A thorough scientific investigation of the pharmacological and toxicological effects of *T. cucumerina,* is important not only to scientifically validate its traditional uses, but also discover any (a) hitherto undiscovered bioactivities that could be exploited and (b) adverse effects it may produce. Further, such a study would help in the isolation of newbioactive compounds that could be developed in the future into novel plant based drug preparations. The following is a brief overview of pharmacological and toxicological investigations carried out on *T. cucumerina* of Sri Lankan origin.

Fig. 1 Trichosanthes cucumerina Linn. (Fig. 1) Aerial parts

Antiinflammatory activity:

In Sri Lanka, the aerial parts of *T. cucumerina* are used along with other plant materials for inflammatory conditions despite the lack of scientific investigation for such activity in this plant[2.] Carrageenan – induced paw oedema

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model is widely used for determining the acute phase of inflammation[3,4]. Investigations carried out by Arawwawala and co-workers[5,6], using the above model of inflammation have shown that hot water extract (HWE), cold ethanolic extract (CEE) and fractions (MEF: methanol fraction and AQF: aqueous fraction) of T. cucumerina HWE have a marked ability to counter acute inflammation induced by carrageenan. The results help to rationalize the use of *T. cucumerina* as an anti inflammatory agent in the traditional systems of medicine in Sri Lanka.

Apart from the lowest dose of the HWE (375 mg/kg), other tested doses (500, 750, 1000 mg/kg) of HWE and CEE (750 mg/kg) produced a significant ($p \leq 0.05$) inhibition of the inflammation, most pronounced at 5 h after the injection of carrageenan. The anti inflammatory effects induced by 750 mg/kg of HWE and CEE, were comparable to that of the reference drug, indomethacin at 4 and 5 h. Among the tested fractions of HWE, the methanol fraction (MEF) and aqueous fraction (AQF) at a dose of 75 mg/kg significantly inhibited carrageenan-induced hind paw oedema. The antiinflammatory effect induced by MEF, was comparable to that of the reference drug, indomethacin and as well as to the 750 mg/kg of HWE and CEE at 4 and 5 h. In a previous study using carrageenan-induced mouse hind paw oedema model, Kolte and co-workers[7] have also reported the presence of anti inflammatory components in hot aqueous extract of *T. cucumerina* root tubers. Inhibition of histamine and nitric oxide (NO) production and membrane stabilization activities were shown to be probable mechanisms by which *T. cucumerina* mediates its anti inflammatory actions. These findings help to rationalize the traditional use of *T. cucumerina* as an anti inflammatory agent.

Antidiabetic activity:

Diabetes mellitus is a chronic metabolic disorder affecting approximately 4% population worldwide and is expected to increase by 5.4 % in 2025. *T. cucumerina* is one of the major ingredients in several polyherbal preparations that are prescribed in Sri Lanka for the control of Diabetes Mellitus[2,8].

Investigations carried out[5,9] using both normoglycemic and streptozotocin (STZ) – induced diabetic rats (Type 1 and Type 2) as experimental models demonstrates that the HWE and CEE of aerial parts of *T. cucumerina* grown in Sri Lanka can significantly ($p \leq 0.05$) reduce serum glucose levels in normoglycemic rats. In STZ-induced Type 1 and Type 2 diabetic rats, no immediate hypoglycemic effect was observed with administration of HWE. However, with continuous administration, there was a gradual reduction in serum glucose levels. At the end of 28 days, in both normoglycemic and STZ-induced diabetic rats (Type 1), there was a significant ($p \leq 0.05$) increase in the levels of liver glycogen and adipose tissue triglyceride levels, in comparison to the respective controls that did not receive HWE. The capability of the HWE to enhance the insulin secretion may be the reason for this. Results[5] with Type 1 diabetic rats are in accordance with findings reported by Kirana and Srinivasan[11], who administered aqueous extract of whole plant of *T. cucumerina* grown in India to STZ- induced Type 2 diabetic mice. Similar to these[5], there was a significant ($p \leq 0.05$) reduction in blood glucose level and significant ($p \leq 0.05$) increase in the levels of liver glycogen and adipose tissue triglyceride levels in STZ-induced Type 2 diabetic mice that received aqueous extract of *T. cucumerina* of Indian origin[11]. Kar and co-workers[12] also reported that administration of ethanolic extract of seeds of *T. cucumerina* grown in India can exert a significant ($p \leq 0.05$) reduction in blood glucose levels in alloxan induced Type 1 diabetes rats. It is interesting to find that in the investigation by Arawwawala and co-workers[10], the HWE of *T. cucumerina* not only lowered serum triglycerides, total cholesterol and LDL levels but also enhanced the cardio protective lipid HDL, in STZ – induced (Type 1 and Type 2) diabetic rats after 28 days treatment. However, HWE failed to inhibit intestinal glucose uptake. Therefore, *T. cucumerina* exerts significant ($p \leq 0.05$) antidiabetic activity, possibly through multiple effects involving pancreatic and extra pancreatic mechanisms rather than inhibition of intestinal glucose uptake. *T. cucumerina* may therefore not only be useful for the control of Diabetes mellitus, but also for management of hyperlipidemia associated with this condition.

Gastroprotection:

A polyherbal preparation used in Sri Lanka as a remedy for gastric ulcers is Patoladi decoction[2]. It contains *T. cucumerina* aerial parts and four other plant ingredients: *Terminalia chebula* Retz, *Terminalia belerica* Rox *Phyllanthus emblica* Linn and *Azadirachta indica* A. Juss. Contribution of each component in Patoladi to the alleviation of gastric ulcers has not been evaluated. Recent studies[5,13] have demonstrated that aerial parts of *T. cucumerina* (growing in Sri Lanka) alone has the potential to exert significant ($p \leq 0.05$) gastroprotective activity. Significant ($p \leq 0.05$) inhibition of the formation of gastric ulcers (in terms of length and number) induced by absolute ethanol or indomethacin in rats by HWE (375, 500 and 750 mg/kg) and CEE (750 mg/kg) provides evidence to support the presence of components in *T. cucumerina* that can exert significant ($p \leq 0.05$) gastroprotection. The gastroprotective activity of a 750 mg/kg dose of HWE or CEE was comparable to that mediated by the reference drugs cimetidine and sucralfate. Findings also indicate that increasing the

protective mucus layer, decreasing the acidity of the gastric juice and antihistamine activity are probable mechanisms by which *T. cucumerina* mediates its gastroprotective actions.

Antioxidant activity

During the past three decades there has been an increasing interest in finding naturally occurring antioxidants from plant materials to replace synthetic antioxidants consumed as foods or medicines[14]. Investigations have been carried out by Arawwawala and co-workers[15] to evaluate the antioxidant potential of *T. cucumerina* aerial parts, by use of in vitro [(a) 2,2-diphenyl- 1- picrylhydrazyl (DPPH.) scavenging assay (b) thiobarbituric acid reactive substances (TBARS) assay and (c) β – carotene – linoleic acid assay] methods and in vivo studies using a rat model.

The overall results of investigations carried out[15], demonstrate that both HWE and CEE of *T. cucumerina* can exert significant antioxidant activity as evident from their ability to (a) scavenge free radicals such as DPPH. and linoleic in vitro (b) enhance activities of the antioxidant enzymes such as superoxide dismutase (SOD) and Glutathione peroxidase (GPX) in vivo and (c) inhibit lipid peroxidation in vitro and in vivo.

Antimicrobial activity:

Staphylococcus aureus, Streptococcus pyogenes, Escherichia coli, Pseudomonas aeroginosa, Streptococcus pneumoniae and *Klebsiella pneumoniae* are some important bacterial strains causing wound infections. A wide range of antibiotics (e.g. erythromycin, tetracyclines, trimethoprim, sulfonamides, gentamicin, etc) are being used at present for treating wound infections[16,17]. Bacterial resistance to antibiotics is a major therapeutic problem and the rate at which new antibiotics are being produced is slowing[18]. The presence of bacteria within a wound cause infections and delay the healing. Investigations carried out by Arawwawala and coworkers[19], using (a) colony count and (b) disc diffusion techniques has demonstrated that aerial parts of *T. cucumerina* of Sri Lankan origin can inhibit the growth of some selected bacterial strains such as *Staphylococcus aureus* (NCTC 25923), *Streptococcus pyogenes* (NCTC 20258), *Escherichia coli* (NCTC 25922) and *Pseudomonas aeroginosa* (NCTC 20620) that are known to cause wound infections. Results also show that the CEE can exert consistently better antibacterial activity than the HWE. It was noted that gram negative (-) bacteria such as *E. coli* and *P. aeroginosa* appear to be less susceptible to the effects of the HWE or CEE than the gram positive (+) bacteria *S. aureus* and *S. pyogenes*.

Toxicity:

Herbal medicines are regarded by the public and some health care providers to be gentle and safe, but there is no scientific basis for this belief. The active ingredients of plant extracts are chemicals that are similar to those in purified medications, and they have the same potential to cause serious adverse effects. The usefulness of any drug depends not only on its therapeutic efficacy but also on its lack of toxicity or adverse side effects. Investigations of acute and chronic unacceptable side effects of *T. cucumerina* aerial parts are therefore important.

Using mice as the experimental model, Arawwawala and co-workers[20] have recently demonstrated that extracts (HWE or CEE) of T. cucumerina aerial parts do not produce any serious toxic effects or mortality even at a doses up to 30 g/kg. Oral treatment with HWE or CEE for 14 days or 42 days failed to bring about any overt signs of toxicity (salivation, diarrhoea, lacrymation, tremors, ataxia, yellowing of hair, loss of hair, postural abnormalities or behavioral changes), stress (fur erection or exophthalmia), aversive behaviors (biting paw and penis, intense grooming behavior, scratching behavior, licking at tail or vocalization) and mortality. HWE and CEE treated mice showed normal food and water intake. The consistency of faeces and color of urine of the HWE and CEE treated mice were similar to that of respective control groups.

The extracts also did not produce any signs of hepatotoxicity or renotoxicity (as judged by histopathological observations, liver and kidney function assessments) or unacceptable effects on fertility of males or females (as evident from the effects of the HWE and CEE on early aborfacient activity and implantation in female rats and spermicidal activity in vitro).

CONCLUSIONS

In recent years, ethnomedicinal studies received much attention as this brings to light the numerous little known and unknown medicinal virtues especially of plant origin which needs evaluation on modern scientific lines such as pharmacognostical, pharmacological investigations and clinical trials. *T. cucumerina* exerts strong antiinflammatory, antidiabetic and gastroprotective effects, validating the claims in traditional medicinal systems of Sri Lanka. In addition, hitherto unreported bioactivities such as antioxidant and antimicrobial activities were also discovered. However, it is imperative that more clinical and pharmacological studies should be conducted to investigate the unexploited potential of this plant and if possible identify active components responsible for mediating its pharmacological activities.

ACKNOWLEDGEMENT

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The Culture of Science

There is an increasing worldwide consensus on the vital importance of science for personal, social, economic and political development. This has spurred many countries to increase their investments in science and technology. But funding research is not enough. Nations must also promote cultures that celebrate science and its values of reasoning, openness, tolerance, and respect for evidence, just as they celebrate the arts and humanities, which enrich everyone's lives. Not only formal education but informal outreach is critical in achieving this goal.

John Durant and Alan Ibrahim in SCIENCE (2011) vol331, 11th March 2011

ANTIDIABETIC NONI JUICE FROM THE FRUITS OF SRI LANKAN *MORINDA CITRIFOLIA*

*By S. Sotheeswaran**

Noni Fruit and the plant Morinda citrifolia

Introduction

Morinda citrifolia is native to South East Asia but has been extensively spread throughout the Indian sub continent, Pacific Islands, French Polynesia, and recently in the Dominion Republic. Tahiti remains the most prominent growing location in the Pacific. The plant and the drink derived from the fruits of this plant have gained popularity in the recent past and are popularly known Worldwide as NONI, derived from the Tahitian name for the plant *Morinda citrifolia*. Though noni is used in soaps, shampoos and skin creams, noni tablets are also now available and are gaining popularity in the Pharmaceutical Industry as a non-diabetic medication.

Morinda citrifolia grows in Sri Lanka but the noni juice sold in pharmacies (mainly of the Harcourt Group), are mainly imported from India. In India there is a famous World Noni Foundation based in Chennai. The very first World Noni Congress was held in Chennai in December 2010 to popularize the anti-diabetic properties of the noni fruit juice.

Chemistry and Pharmacological Activity

M. citrifolia fruit powder contains carbohydrates and dietary fibre in moderate amounts. These macronutrients evidently reside in the fruit pulp, as *M. citrifolia* juice has sparse nutrient content. The main micronutrients of *M. citrifolia* pulp powder include vitamin C, niacin (vitamin B3), iron and potassium. Vitamin A, calcium and sodium are present in moderate amounts. When *M. citrifolia* juice alone is analyzed and compared to pulp powder, only vitamin C is retained in an amount that is about half the content of a raw navel orange. Sodium levels in *M. citrifolia* juice (about 3% of Dietary Reference Intake, DRI) are high compared to an orange, and potassium content is moderate. The juice is otherwise similar in micronutrient content to a raw orange.

M. citrifolia fruit contains a number of phytochemicals, including lignans, oligo- and polysaccharides, flavonoids, iridoids, fatty acids, scopoletin, catechin, beta-sitosterol, damnacanthal, and alkaloids. Although these substances have been studied for bioactivity, current research is insufficient to conclude anything about their effects on human health. These

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phytochemicals are not unique to *M. citrifolia*, as they exist in various plants.

However, many advertisements claim that noni juice has the ability to stimulate the sluggish pancreatic cells of diabetics to secrete more insulin and that noni also stimulates body cells to take up more insulin in order to utilise glucose more efficiently. The advertisements go on to claim that some researchers have isolated and identified active substances like proxeronine, which participate in many metabolic processes. But if anyone attempts to check the veracity of these claims in the literature, one can see references to proxeronine and its discoverers Dr Heinicke and Dr Solomon only in websites references advertised by Tahitian Noni International – a Commercial Company that markets noni juice to the world. These results are not to be found in any recognized International Journals and the structure of xeronine cannot be found in the literature. There is no proper scientific evidence available to confirm if noni has anti-diabetic activity.

In a study conducted by us in Fiji, we have evidence to show that noni juice has good antioxidant activity. Laboratory experiments demonstrated that dietary noni juice increased physical endurance in mice. A pilot study in distance runners showed increased endurance capacity following daily intake of noni juice over three weeks, an effect the authors attributed to increased antioxidant status.

Possible medicinal properties

Noni has been evaluated unsuccessfully in preliminary clinical trials for possible use in treating cancer, although the US National Cancer Institute has undertaken further preliminary studies for potential preventive effects against breast cancer. Since 2007, there have been no other registered clinical trials on potential health benefits or anti-disease effects of noni, which remains scientifically undefined for any effect on human health.

Traditional medicine

Applications in folk medicine have not been verified by modern science or confirmed scientifically to enhance health or prevent disease. Although unsupported by science, the green fruit, leaves and the root/rhizome were traditionally used to treat menstrual cramps, bowel irregularities and urinary tract infection. Therapeutic uses of Noni are recorded in Indian systems of medicine - Ayurveda and Siddha.

Although noni's reputation for uses in folk medicine extends over centuries, no medical applications as those discussed below have been verified by modern science. In China, Samoa, Japan, and Tahiti, various parts of the tree (leaves, flowers, fruits, bark, roots) serve as tonics and to contain fever, to treat eye and skin problems, gum and throat problems as well as constipation, stomach pain, or respiratory difficulties. In Malaysia, heated noni leaves applied to the chest are believed to relieve coughs, nausea, or colic. The noni fruit is taken, in Indochina especially, for asthma, lumbago, and dysentery. As for external uses, unripe fruits can be pounded, then mixed with salt and applied to cut or broken bones. In Hawaii, ripe fruits are applied to draw out pus from an infected boil.

The green fruit, leaves and the root/rhizome have traditionally been used to treat menstrual cramps and irregularities, among other symptoms, while the root has also been used to treat urinary difficulties. There have been recent applications also for the use of oil from noni seeds.

Noni seed oil is abundant in linoleic acid (omega-6 fatty acid) that may have useful properties when applied topically on skin, e.g., anti-inflammation, acne reduction, moisture retention. Linoleic acid is a member of the group of essential fatty acids called omega-6 fatty acids, so called because they are an essential dietary requirement for all mammals.

Fiji Study

Considering the booming sales of noni products, we undertook a study in the South Pacific to assess the antioxidant activity of the Pacific noni drink.. In this investigation, the commercial noni fruit drink exported to Australia from Fiji was shown to have very high total polyphenol levels (375.1 mg/100g) compared to turmeric (*Curcuma longa*) (320 mg/100g). The total antioxidant capacity assay (TAC) showed that commercially prepared noni drinks had a high (4.6 g/100 ml) antioxidant level.

In another study that we conducted in the Fiji Islands, we interviewed 406 individuals; 174 males and 232 females. The survey was concerned with the types of illnesses for which noni was used; part of the plant used; and the results of the use. Most of the respondents, who had various ailments, claimed that their conditions improved after taking noni. Noni was found to be beneficial in sixty seven medical conditions.

Noni fruit was identified by these people as the preferred part of the plant. But, many said that every part of the plant was useful. Many different types of preparations were used for various conditions such as:

- Ripe fruit and green fruit to treat back ache and headache, and also to treat joint pains/swellings/ arthritis/sprains, muscle pain, and also stroke.
- Leaves were used for massaging and headache, for joint

pains/swellings/arthritis/sprains, muscle pain and stroke. Seeds, bark and roots were also fused or massaging and headache.

- Noni soap or cream was used for many skin conditions; leaves were also used for these conditions. According to some, noni soaps enhanced physical beauty.
- Mainly ripe fruits, leaves and also roots were used to cure diarrhea.
- For oral problems, young fruit is grated and the juice is applied to the mouth or the juice drunk.
- Though noni fruits were the preferred, young/green/ or even rotting fruits are also used. A majority of the users preferred to drink boiled noni fruit juice.

Some even preferred the fermented noni juice. Urban users prefer noni soap or cream purchased from the supermarkets. Side effects such as - vomitting; itchiness; allergic reactions; weakness of the body; rise in blood sugar level; weight loss during pregnancy; oral thrush; stomach upset- were considered to be only temporary.

Many villagers said that one should not waste too much money buying medicines for muscle pains, sprains or torn muscles, but should use noni from the garden.

Some comments by the Fijian villagers are given below:

"Noni soap is good for reducing pimples and rashes".

"Noni did cure my diabetes".

"Noni soap is good to cure fungal infection of the skin".

"Take noni fruit juice for good health".

"Noni juice is a good medicine for stomach ache".

"Noni cured my constipation"

"Noni cured my heartburn"

"Noni works for me, but I do not like the taste or smell"

"Cured my arthritis and high blood pressure"

"It is a good medicine, can cure any sickness"

Though noni is being popularized world wide as a cure all medicine by the noni producers in the Pacific, no clinical trials are available to satisfactorily promote noni as a health drink to cure diabetes and blood pressure.

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From Atta-ur-Rahman FRS.

The exciting developments in Science and Technology are transforming the world we live in. The only constant is change. Nations that can ride this change rather than be buried in it are surging forward, leaving others behind. The change is being driven by new scientific discoveries. These are then transformed into technologies. Then through innovation and entrepreneurship they become products of daily use. This is apparent in almost every sphere of our lives: Engineering goods, household appliances communication tools, electronics. Pharmaceuticals and many other fields are evolving with increasing rapidity.

Until the flour is baked in the oven it cannot be called Bread. Until the words are spoken they cannot be called a Poem. Until the threads are woven they cannot be called cloth. Await the Transformation.

PROMINENT RESEARCHERS NO.10

DJAJA DOEL SOEJARTO
INTERNATIONAL MASTER OF MEDICINAL PLANT BOTANY

By R. O. B. Wijesekera

Professor Doel Soejarto

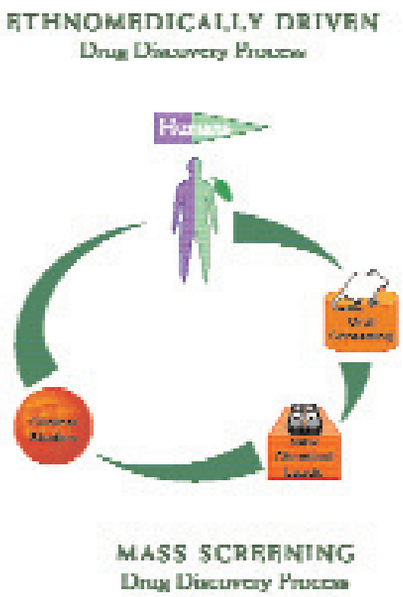
I was first privileged to personally meet Doel Soejarto when in the autumn of 1978 I was destined to take up the position of Task Force Manager in Geneva, of the WHO – HRP project, named as: "Plants for Fertility Regulation". Doel Soejarto, was the consultant botanist of the programme and, like myself, he too was a nominee of Norman R. Farnsworth the great authority on medicinal plants, who was a primary consultant to WHO on this programme. (vide. Digest Vol.8 No.1). Doel Soejarto was a long time research colleague within the group led by the late Professor Farnsworth at the College of Pharmacy, University of Chicago, Illinois. Today he is world renowned as a pioneer botanist, and an authority on plants of therapeutic value. He is also the proud holder of the ABC's Farnsworth Award of Excellence in Botanical Research.

In the task force of WHO of which I was the manager during 1978-80, he was the chief botanical consultant, and was responsible for the planning of the botanical protocols that were used by the programme.

The WHO-HRP programme was to research plants worldwide that were used traditionally in some form of fertility regulatory activity, with the aim of finding an almost ideal fertility regulating agent namely, one that was water soluble, and would prevent or disrupt implantation within the uterus. In other words: a "morning after the night before" pill. It had to be non-steroidal as it was felt by the international steering committee that steroidal chemical entities were synthesizable. The task force was committed to look for plant derived chemical structures that were unique. Within the two year research we were able to find several leads; (WHO had no funds for complete drug development and were compelled to call in drug development firms to capitalise on the research). But two compounds at least are now in clinical use as abortifacients.

Doel's role in developing the botanical protocols, were a singular contribution to the programme.

A native of Indonesia, Doel earned his Master's and Doctorate degrees at Harvard University, which was made singularly famous for botanical sciences by the presence on its faculty of the legendary Professor Richard E. Schultes. Doel subsequently participated in several major ethno medically driven drug development programmes and was the leading botanical expert in them all.



Other highlights of the distinguished career of Doel Soejarto are: the taxonomic revision of the genus Saurauia, the discovery of the anti-HIV Calanolides, from the Callophyllum spp., and the founding of a herbarium, in the University of Anitoquia, in Colombia,- where he resided.

He has also pioneered an international collaborative research programme on the bioactive plants in the flora of Laos and Vietnam, which programme has been able to generate over fifty potentially active compounds, and develop methodologies for drug development. He remains an active scientist and a most sought after authority and teacher at University level. He has spoken of the inspiring influence of Farnsworth on his career and the multidisciplinary approach to research which was inculcated into him. One cannot write of Doel without bringing into the theme his life-long friend and colleague Harry Fong, another of the protégés of Norman Farnsworth. Of Soejarto, Professor Fong (now retired,) has recently stated: " Doel has devoted half a century to the multidisciplinary study of medicinal plants including taxonomy, ethnobotany, biodiversity inventory and conservation, drug discovery and intellectual property rights of indigenous people."

Doel is without doubt a legend in the medicinal plant related scientific arena.

The compulsion to see what lies beyond that far ridge or that ocean – or this planet- is a defining part of human identity and success.

David Dobbs in the National Geographic Magazine Jan 2013.

Cycle of Nature

In the Cycle of Nature there is no such thing as victory or defeat. There is only movement. The winter struggles to reign supreme but in the end it is obliged to accept spring's victory, which brings with it flowers and happiness. The summer would like to make its warm days last for ever because it believes warmth is good for the Earth, but in the end it has to accept the arrival of autumn which will allow the earth to rest.

Within the cycle of nature there are no winners and losers. There are only stages that must be gone through. When the human heart understands this it is free and able to accept difficult times, and not be deceived by moments of glory. Both will pass. One will succeed the other. And the cycle will continue until we liberate ourselves from the flesh, and find the Divine Energy.

Fountain of youth

The search for the mythical fountain of youth may have ended with Ponce de Leon, but millions of us hold out hope, that Science will discover the secret to beat ageing, the special formula that will keep our skin and our insides from displaying the wear and tear of the years.So we hope that this new compound or this herb can slow the ageing process and improve both our appearance and quality of life.

Andrea Collier& Gary Devitch.

PRODUCTS FROM LINK NATURAL

THE NEW SHEERSHAPTI RANGE OF HEAD AND HAIR CARE PRODUCTS.

Over the past two and a half decades, Link Natural has blazed a trail in the local manufacture of internationally competitive herbal products. The quality and consistency of products such as Samahan, Sudantha and Kesha are now globally established, and well recognised.

In the wake of such a locally and internationally established record, comes a new Link Natural range of products designed for the care of head, scalp and hair. The new range is styled as SHEERSHAPTI.

The term: "sheershapti', underscores an important tenet in the Ayurvedic system of health care. This is, that maintenance of a healthy head is deemed to be supremely important.

Link Natural from the very beginning, had as its inspiration the deep wisdom incorporated in the corpus of Ayurvedic knowledge, now universally recognised and scientifically respected worldwide. With this theme and a carefully built and motivated research team Link Natural was able to forge ahead with the spectacularly successful products that it has been able to place on the market. It is well recognised now that the products from Link Natural carry with it the stamp of genuine Ayurvedic authenticity combined with the reliability, efficacy and safety associated with products that are scientifically processed and quality controlled.

In Ayurveda, health and wellbeing is a holistic concept, indicating a healthy body and a healthy mind. As such the maintenance of a healthy head, scalp and hair, is an important component, and assumes much significance in overall health. Link Natural's Research has hitherto provided the market with the celebrated product KESHA, and this in two variants; and these have been significantly popular. However Link Natural's on-going research prompted the company to address the new emerging needs that may impact with health problems. Stressful conditions of modern living constitute a preeminent issue. Accordingly, the researchers at Link Natural have developed a new range of four products for the present day market which addresses newer needs. The Link Natural KESHA, and Link Natural KESHA Jasmine, will now come in an improved packaging. This formulation has up until now been so well received, and enjoys a satisfied clientele who will now relish the new presentation. These formulations have formed the family hair care mainstay in a significantly growing number of consumers. The presentation Link Natural Hair Care Cool was specially designed to satisfy youthful desires and aspirations, and has been remarkably successful in that domain. It too is re-introduced in an improved formulation and packaging.

Link Natural's ever vigilant and innovative scientists have noted that due to various factors there is a present day tendency for hair to become prematurely grey, and more disastrously for the falling of hair to set in well before old age itself. This seems to be an issue common to both sexes. It is to address this issue that the Link Natural's Research team have developed the new and innovative product named: AKALAPALITHA. This mildly perfumed hair oil comes to the market formulated from the herbal ingredients used in Ayurveda for preventing premature greying and loss of hair. The remedy is a long established, and time tested one. but the Link Natural's new product has the advantage of being scientifically processed and formulated. The

Ayurvedic herbals employed are noted to arrest the fall of hair as well as to nourish the scalp to promote the regeneration of healthy hair. These authentic herbal constituents as mentioned in the Ayurvedic literature have been carefully selected and authenticated scientifically prior to processing. The process technology has been developed at Link Natural, to suit the product requirement, and the product is quality standardised. When regularly used in the approved manner this is bound to be a boon particularly to the young who may, unfortunately, suffer from the malady of falling hair.

The new SHEERSHAPTI range of products, released in November 2013, will open a new era in health care with products with authentic natural Ayurvedic ingredients and produced under scientific surveillance. Consumers are assured of products of the highest standards in keeping with the international reputation of Link Natural.

Tea Legends

According to Chinese legends Tea was discovered approximately 5000 years ago when teal leaves were said to have blown into a cup of warm water which was destined for the Emperor Shen-Nong. Today Tea is known as the most desired and the most consumed beverage in the world after water. A recent review titled "Medicinal Chinese Teas" focuses on the health value of various Chinese preparations from Tea (Cameliasinensis). A specific type of Tea known as Dark Teanor Fermented Tea is presented in the form of bricks or cakes. They have been subject to a specific microbial fermentation process and are viewed as special therapeutic agents which are now being researched as a possible agent for the treatment of Type 2 Diabetes, certain cancers and cardiovascular ailments.

Tiffany I Weir , with seven co authors has reviewed the medicinal benefits'

Herbalgram. No 94 May-Jul 2012. P 10. Features 42.

Do not try to make the road shorter but travel in it in such a way that every action leaves the land more fertile and the landscape more beautiful. *Old Sayings*

Launch of Sheershapati Range of Products

STRANGE FACTS ABOUT SOME OF OUR PLANTS AND TREES

By C G Uragoda

Our history, dating from ancient time, has demonstrated interesting facts centred on some of our plants. Modern western medicine has proved the accuracy of these events associated with plants.

Bitter Gourd

A large number of Indians lived in the suburbs of Manchester. Quite a number of elderly people, many of them unable to speak English though they had lived for years in England, were admitted to Manchester Infirmary, some in a coma. It was found they all had diabetes and were under regular treatment at that hospital and were in good condition till the present episode occurred The doctors at the hospital were wondering whether these patients had increased their normal dosage of drugs.

It was later found that all these events took place about the time that bitter gourd arrived in plenty from India. All these patients had eaten it but had taken the usual dose of anti diabetic drugs .These doctors were driven to the conclusion that bitter gourd had an anti diabetic effect and when these patients ate curries of this vegetable while taking their anti diabetic drugs in the given dose, they had a further drop in body sugar level and as a result went into a coma.

It may be added that some researchers in Sri Lanka too carried out research on bitter gourd and found the same effect on diabetes.

Nillu Flowers

Nillu plants grow in the highlands of Sri Lanka such as Horton Plains and Nuwara eliya. Several species of the genus *Strobilanthus* grow here but the best known is *S. sexennis,* so named because it was thought to flower every 6 years but actually it takes 11-13 years to flower. These mauve (bright purple) flowers were seen Horton Plains during November and December 2013. These flowers are plentiful during the season and attract various animals such as Bambara bees who suck the nectar which is rich in sugary components.

Another animal that is attracted by the flowers is the jungle fowl which may become comatose during the visit and is easily clubbed to death by the villagers. It is likely that a couple of days after the flowers fall to the ground, the sugar rich nectar may ferment and produce alcohol which is drunk by the jungle fowl who become comatose as a result.

Madar tree

Madara *(Cleistanthus collinus*) is a short tree which is very rare in Sri Lanka, the known number being about 5 or 6 .Only one tree known to have grown in the jungle was found in Uggal Kaltota, which is about 18 km from Balangoda on the road to Hambegamuwa. It was visited to by people who cut off its branches or pieces of bark as souvenirs which were supposed to ward off evil. It was described by Basett (1934) who visited the tree when he was Government Agent at Ratnapura, but when Brohier (1966) went to see the tree , it was found to have died about 10 years earlier as a result of being harnessed by visitors.

The leaves are almost circular and about 6cm long. The tree's branches are filled with plenty of leaves, obstructing the view beyond. The flowers are very small indeed each greenish coloured petal measuring only ½ cm. These flowers could be seen as several tiny spots on a branch in the angle between it and the leaf .The fruits are also small in size and number and each consisting of three lobes and each containing a seed.

In the kraals that took place in Panamure to capture wild elephants , Maduwanwela Ratemahattaya who was the chief organizer, entered the stockade where the wild animals were imprisoned carrying a walking stick originating from a madara tree. It was supposed to give him protection from the wild elephants.

Medicinal Gardens

A few areas with a concentration of medicinal trees have been found in Sri Lanka. The best example of such a garden is near the village of Pitakumbura, about 10km from Bibile on the road to the Veddha village of Nilgala. It extends over a distance of several kilometers. Another such a forested area was found when preliminary investigations were being conducted before the construction of the Samanalawewa dam.

The predominant trees in these medicinal forests are Terminalia chebula (Aralu S), *T belerica* (Bulu S) and *Emblica officinalis* (Nelli S). The products of these trees namely aralu, bulu and nelli go into some of the most frequently used drugs in Ayurveda and this fact was responsible for the legend that these were royal forests cultivated for medicinal purposes by ancient kings. This explanation has found acceptance among ayurveda physicians and other interested persons though there has been no historical evidence to support this theory. There is no mention of such medicinal gardens in ancient literary works or lithic inscriptions. The scientific explanation of this phenomenon is quite prosaic and contrary to the romanticism attached to a royal medicinal garden.

These three species of trees , along with a few others such as *Careya arbora* (Kahata S) are rich in tannin and are fire resistant. Periodic burning of the jungle by villagers in the pursuit of their traditional but destructive system of chena cultivation was a characteristic occurrence in these jungles. Some of these fire resistant species may manage to survive unlike other trees and with the next rains may become revitalized. With repeated burning of vegetation over the years, other species die off while these medicinal progressively become the dominant vegetation of the area.

Plantain trees and air purification

Some traditions which on face value appear as inexplicable practices of long usage, would on closer scrutiny reveal an inherent mechanism for air purification. Plantain trees demonstrate this point well.

Plantain or banana trees are placed at entrances to Hindu temples during festivals, where a large number of people gather in a restricted place. They would be exhaling carbon dioxide which contributes to atmospheric pollution. Leaves in the normal course of photosynthesis would absorb carbon dioxide and give out oxygen. The net effect of these trees within the confined space of the overcrowded temple would to be to replace carbon dioxide with oxygen and thereby purify the air.

The uprooted plantain tree is well equipped to perform this function. The leaves are very large and therefore the extent of surface availability for this reaction is correspondingly vast. The leaves would remain viable for several days as these leaves have not been detached from the tree.

Reference

1. Basset, R H (1934) Romantic Ceylon. Its history;legend and story 2nd edition The Colombo Apothecarires Co ltd
2. Brohier R L (1966) The pillage of a protected tree Loris 10(6) , 371-372

Binet, Alfred

On his intelligence scale

The scale, properly speaking, does not permit the measure of the intelligence, because intellectual qualities are not superposable, and therefore cannot be measured as linear surfaces are measured.

Quoted in Stephen Jay Gould, The Mismeasure of Man, W.W. Norton and Co., Ltd, NY, 1996, p 181. (1)

TRENDS IN COSMETICS - INSPIRED BY TCM

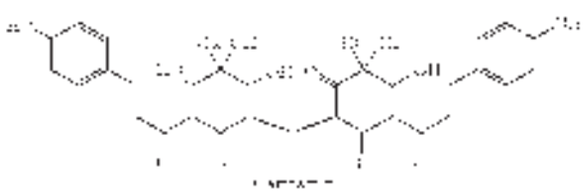
Cosmetics based on Traditional Chinese Medicines (TCM's) have begun to hit the world market stage in a burgeoning manner. Most of the products belong to the two categories "anti-ageing products" and "moisturiser products". In general terms cosmetics and personal care products based on TCM's are formulated using herbal drugs utilised in TCM's for medicinal purposes, but equally important is the aspect that cultural practices and theories also come into play in their preparation. These theories represent an approach to health that is alien to those of western concepts. They regard the human body as one organic whole, in somewhat similar fashion to the concepts within the Ayurvedic system. These theories too hold that though the viscera and tissues in the body have their own separate functions, they nonetheless act in coordination in the maintenance of normal life activities. Moreover the human body is considered along with its natural surroundings, which are inter-dependent, as a single organic entity. Accordingly, even body surface and skin conditions such as acne, pigmentation, complexion, dry or course skin, and other blemishes are viewed as the outcome of a disturbed harmony among the viscera, tissues and organs or between the human body and the surrounding external environment.

The use of agents of TCM in the production of cosmetic products is therefore very much derived from the medicinal and pharmaceutical applications of TCM. Historically in China TCM has been employed for many millennia as a traditional means of skin care and there are plentiful instances where herbal skin care therapies have been popularly used.

There is evidence too that in the present day there has been a noticeable increase of products incorporating, for example, extracts of aloe, gingko, Angelica sinensis, Artemesia stelleriana, and ginseng. It is also noted that cosmetic agents based on TCM are not merely products where the ingredients are derived from herbal agents used in TCM. They are also based on the theories of TCM and formulated and produced accordingly.(Li, 2012)

TCM has a deep history of use in the production of cosmetic agents. There is evidence of such uses in facial care, body washing, and make up, aromatherapy, hair care, and skin care that date back over three millennia. Records, according to Li, indicate that ancient people ground up rice to a fine powder and applied it to their face as a means of whitening the skin. This practice dates back to several millennia. They also used powdered rice dyed red as a blush and such powder has been archeologically discovered in ancient caves. It is believed that the ground-up rice powder physically concealed facial dullness and at the same time enriched the skin through the various types of promoters in the rice. This has found scientific confirmation in modern research.

The Hong lan flower, Flos carthami, or Safflower, also known as Hong Hua was the source of a cosmetic named as Yan-Zhi, used as a blush, and described as a plant that contains flowers with a dye that can be used as a pigment to enrich a woman's cheeks. It contains a flavonoid that generates a pigment as modern scientific evidence confirms. It is known in TCM to be used for treating several ailments that also have a bearing on skin conditions.



Several texts of TCM record the uses in cosmetology and one of the earliest preserved ones is the "Wu Shi Er Bing Fang", which had been excavated from an ancient tomb of the western Han Dynasty of the Hunan Province. This work records many prescriptions for skin care and skin whitening. Another book Shen Nong Ben Cao Jing, records over 160 cosmetology functions and gives details of the mechanisms and actions. The TCM literature, according to Li, is a plentiful resource for the modern cosmetics industry and present trends indicate it will be amply used.
Reference.

Li, Huiliang. (2012), ***Cosmetics & Toiletries Magazine,*** 127(3), 198-206.

"LINKING" WITH PEPPLE SOCIETY

LAUNCH OF SHEERSHAPATI RANGE OF PRODUCTS

Link Natural Products (Pvt) Ltd., re-launched its hair care range as 'Sheershapati', during an elegant event held on the 1st of November 2013 at the Grand Ballroom-B, Blue Waters, Wadduwa, graced by the LNP sales team, distributors and other distinguished guests.

Assistant Brand Manager for Link Sheershapati Mr. Samitha Gunasekera shared a few words with the audience on the product benefits and elaborated on the product highlights, while Dinesh Angammana, Head of Sale, gave a brief insight into the sales and marketing aspect of the products. The new media presentations were also shown to the audience by Mr Udaya Tennekoon, from Magenta Pvt Ltd. the marketing consultants. The evening continued well into the night, where the guests were entertained to elegant dance acts performed by 'Channa-Upuli' dance troop, and thereafter to a lavish reception

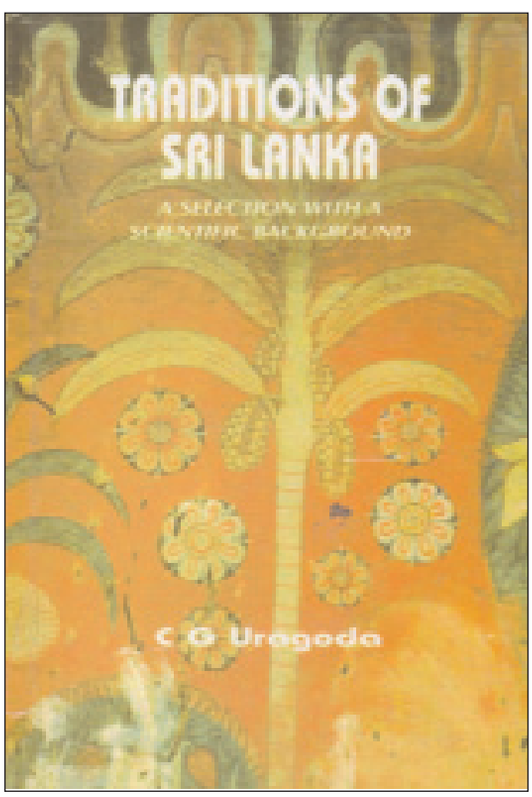
Mr Rohana Weerasinghe and
Mr Dinesh Angammana giving their presentations

Marketing Team comprising of Tharaka Saminda, Yogachandran, Chamari Wickremetilleke, Randika de Silva, Tushitha Kumarakulasinghe, Samitha Gunasekera, Sanath Piyawardene, Dinusha Dhananja

Sheershapati Products

BOOK REVIEWS

TRADITIONS OF SRI LANKA : A SELECTION WITH A SCIENTIFIC BACKGROUND



Author : *C G Uragodaa*
ISBN : *955-96843-0-2*
Publisher : *Vishwaleka Publishers*
Year : *2000*

Traditions of Sri Lanka is a fascinating treatise on the customs and beliefs held by the local community, given with a scientific perspective. Although there have been several discourses on the on the subject of legends and traditions of the country, there was no logical or scientific justification accompanying them. Uragoda has exposed that so called modern discoveries have actually been known to our forefathers and in his book he attempts to document several of these. This treatise covers a wide gamut of areas. Irrigation and farming practices which are ridden with many customs to increase their crops, selected flora indigenous to the country with their traditional usage in health care and the effects of fungi , algae and lichens have been very effectively dealt with. Insects , marine life , snakes and other animals have also been adequately covered , again with their relation to common practices which now are being studied for their rationale. Customs relating to weather and environment , interesting geological formations with associated legends and myths provide fascinating reading. Technological practices such as extraction and processing of mineral resources such as salt petre, iron and steel makes the reader marvel at the ingenuity and skill of our fore fathers. As expected of a country with such a rich heritage of ancient medical systems, traditions pertaining to them have been given exposure particularly where now the scientific validity of them are being studied. The extent of reference sources which the author has had recourse to provides additional reading to the interested reader. An altogether must read book for all those interested in history, learning and science.

Note : An appreciation and Tribute to Dr. Chrisopher Gunadasa Uragoda was written by Prof. Colvin Goonaratna , Consultant on Chemical Trials at Link Natural Products, and was published in the Ceylon Medical Journal, Vol.57. No.3, September 2012

DIGEST MAIL BOX

Letter 1

Dear Editor,

I accidentally saw a copy of Link natural product digest. It is a interesting magazine. Can you please send me copy of the magazine and back issues if available to following address.

Dr R M C S Ratnayake,
Department of Botany,
University of Kelaniya,
Kelaniya.

Response

We would be happy to send you copies of the Link Digest. Since the latest is under print, we will send you all together. Maybe within the next ten days?

Glad you find it interesting

Regards
Dilmani Warnasuriya

Letter 2

Dear Dr Wijesekera

It is great that you are editing the DIGEST. I will be honoured to submit an article to the next issue of the Digest.

I have a lot of interest in the subject . You may not recall this but my very first research publication was in my undergraduate years. It was on "2 dimensional paper chromatography of "Ratha kalaka preparation . The goal of the exercise was to detect adulteration of the mixture with low value 'Rath kihiriya' species instead of genuine red sandalwood. Vanililn (1%) sulfuric acid visualization yields an unmistakable colour pattern for Red sandalwood that also had a characteristic UV active spot. The paper was published in late 70s in the Journal of Ayurveda in Sri Lanka. In fact as I write this I recall you seeing me extract red sandalwood in your lab at CISIR and asked me about it. At the time you suggested mixing the extract with Vaseline or Lanolin and marketing it as a cream. You will make millions you said. Unfortunately I did not follow your advice on this one and am not a millionaire yet.

Dr. Lakshman Andrady
Adjunt Professor
North Carolina State University
Dept of Chemical and Biomolecular Engineering

Letter 3

Thank you again for the Link magazine. Most interesting. Decided to start on samahan daily as I catch every cold and sore throat going and it gets very bad. Becomes bronchitis, wheezing, nasal block , cough etc. an also takes ages to get over it.

Mrs C. Mendis

Letter 4

I have been receiving by airmail to my foreign address the above Digest which you edit. I wish to observe that it always includes very well researched articles and also research news on various herbal and natural products which are now of tremendous interest to consumers as well as others especially in the US who are becoming exposed to related TV and other media presentations.

I would appreciate receiving new editions of the magazine to my overseas address which is in your distribution list Thanking you for providing such a rich resource to your readers.

C R De Silva
Retired World Bank Executive

Letter 5

I have received the latest edition of your esteemed Bi annual journal with gratitude.

I would be highly obliged if you could kindly let me know how I can purchase a copy of "Indigenous Research Methodologies" by Bagela Chikitsa (Published by Sage Publication, USA).

Your journal produces a book review of the same.

I offer my congratulations to you and the entire editorial staff for you valued efforts to bring Ayurveda to the world over.

Prof Sarath Ranasinghe
Consultant ,
Teaching Hospital for Ayurveda,
Rajagiriya

Response

Thank you for your letter re the Link Natural Digest. We really appreciate your comments.

You had inquired from where you could purchase the book, "Indigenous Research Methodologies " by Bagele Chilisa. We , have purchased it at the 2012 Book Fair held at BMICH, from Expographics Ltd. I am sure they will be able to bring it down for you if it is not already available. The price at the time was Rs. 5747/-

Hope this information will be useful to you. I am sorry for the delay in replying your letter.

Dilmani Warnasuriya

Letter 6

Thank you for your generous donation of the publication Link Natural Products Digest to the Sabaragamuwa University. People like you make it possible for us to continue to share the knowledge and information resources for reference purposes for the users of the SUSL library

T N Neighsoore
Librarian SUSL

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.

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

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

Authors may submit manuscripts by By email to :

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robw@linknaturalproducts.com

or

Dilmani Warnasuriya
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Link Natural Digest
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By post to:

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Dilmani Warnasuriya
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P O Box 02
Kapugoda

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

All manuscripts must include the following :

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

The Digest Mail Bag Welcomes Reader's Views & Ideas.

COLLECTIVE INDEX TO LINK DIGEST FROM INAUGURAL ISSUE TO VOL.8