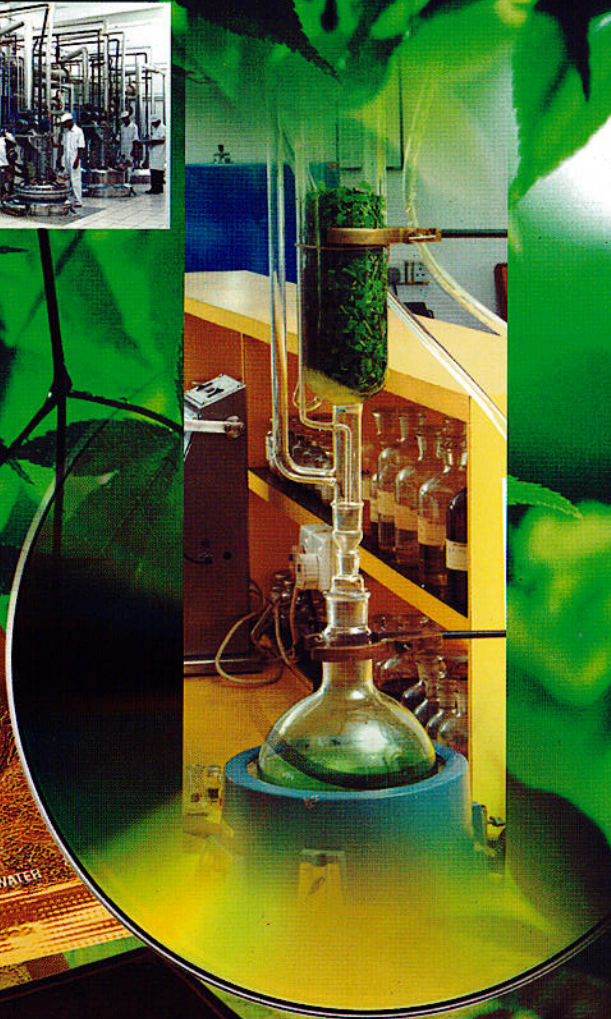


# LINK Natural Products Digest

Vol.3, Issue 2, 2007



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IN THE PAGES THAT FOLLOW.....



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# EDITORIAL

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The world of today is more knowledgeable in matters of an economic nature than the world of our forefathers. Economists do know that many things are true, even if they do not know them with the certainty of a physicist. Most of all they know that labour, expertise and experience, are salable. Even Scientific Knowledge and Technology are regarded as a kind of merchandise. The game consists in learning how to trade this merchandise to get the best possible returns, within certain definable conditions. Some many decades ago, this was not the natural order of things. New knowledge was almost universally shared and displayed. Thus, what we discover by means of scientific research is today guarded. There is now an economic aspect of science, and money has become the index of success. The study of old remedies, and medicinal plants too is now within this network.

The world is fascinated by the lifestyles of the rich, where, fame, and fortune, follow riches. This applies to individuals and corporate bodies as well. Even in the matter of services to humanity, such as health care and education, this seems like the present natural order. The victory of wealth over the old order, had already happened when the famed author Charles Dickens wrote his monumental novel *Dombey & Son* in the mid 1840's. Dickens did not conceal his dismay and disapproval about what had taken place as the following will illustrate.

(Dombey was a rich man, the head of a powerful trading house. His son, Paul, was a sickly lad but with a good head on his slender shoulders. One day Paul asks his father: "Papa, What is Money?". Mr. Dombey was disconcerted by this extraordinary question. "What is money, Paul?", he responds, "Money?". "I mean," says Paul, "what's money after all, what can it do?". "You'll know by and by," Mr. Dombey says to his son, patting him gently on the hand. "Money, Paul, can do anything", he adds. Paul is not put off with such an answer, and he continues to wonder about money. His mother is dead. She

died a few hours after his birth. If money is good, he asks, why did it not save his mama?. He himself is weak and sickly. Money cannot make him strong and well. What then is it good for?)

At the end of the novel, it is revealed that money could not save little Paul, nor indeed the house of Dombey & Son, which had crashed down around Mr. Dombey, together with all his high hopes. He had lost his son, his wife, and all his money. All that remains for him is his daughter, whom he never valued. But she is worth, he finally understands, all the money in the world as well as all the fame and honour.

What inestimable value, therefore, can be counted in the wisdom of traditional medicine and its practices? Their use needs to be safeguarded for all mankind's benefit. Research into these treasures is all mankind's responsibility to support and to collaboratively enhance.

The money culture, now embedded in the corpus of national and international society, is endangering everything of the established value system. It is vitiating the established etiquettes of professionals, who originally provided a service with pride, and now mostly do so for the money. Institutions of Health care, Education, Law enforcement, etc, are being polluted with this malady. Even industries that produce goods for the innocent consumer, pad up their advertising, with disarmingly false "facts" to ensure high sales and profits.

The need for ensuring of quality, even in the goods served up to heal the sick, like pharmaceuticals, phyto-pharmaceuticals, and indeed even processed ayurvedic drugs, is also, sadly, in this category. Can a legal framework to safeguard the consumer be established? Or can a moral change of attitude be engaged?



## LINKED TO AN IDEAL - THE STORY OF LINK NATURAL PRODUCTS



Devapriya Nugawela\*

It is my very great privilege, as the Managing Director & Chairman of Link Natural Products to welcome all of you here, as our guests this evening. You as representing the media, also represent the ears, the eyes and the voice of the people. We are happy to have you here, and I am happy to share with you something of our company's philosophy and our progress during a 25 year journey.

Our company was established in 1982, with modest intentions, to convert our valuable natural resources into a viable industry. Our mission as stated at the time was as follows:

To imbibe and utilize the wisdom of indigenous knowledge and, with Science & Technology at the core, produce and deliver herbal health-care products as well as personal care products for the benefit of humanity.

It was simultaneously our intention, to develop our own national identity, acquire an international credibility, and build an export market capability.

Our beginning was scarcely eventful, but by the turn of the millennium we were fully on the road towards our goal. We had by the year 2000, reached a level of acknowledged stature as a producer of herbal products, both nationally and internationally.

Today as we celebrate reaching our silver jubilee, we are also able to rejoice that our expertise and maturity as a company is well recognized worldwide.

It is thus, to me a great opportunity to be able to introduce our company, its philosophy, and operations to an audience such as your good selves, and through you reach the public of this country.

Man has utilized Natural products for his benefit, since antiquity. Inscriptions show us



that this usage even predates recorded time. But, the basis of our own health care is the traditional knowledge we derive from what had been recorded, in the ancient texts of Ayurveda, - these predate by far, any modern texts relating to medicine. These Ayurvedic texts have been our inspiration and guidance apart from being as I stated the sources of our wisdom. One of the dominant texts in Ayurveda was written by the celebrated Physician Acharya Charaka, around 800 BC. In it he states: and, - let me quote now, from an authentic translation by an acknowledged authority Dr.R.D.Lele:

"The Science of Life shall never attain finality. Therefore humility and relentless industry should characterize ones every endeavor, and approach to knowledge. The entire world consists of teachers for the wise, and enemies for the fools. Accordingly knowledge conducive to health, longevity, fame and excellence coming even from an unfamiliar source should be received, assimilated, and utilized with earnestness."

Now, this is just the philosophy that we as a company followed. We blended the wisdom of Ayurveda, with the concepts, and methods from science and technology, - and that was the driving force for our own operations.

*Text of a speech delivered by the Chairman & Managing Director on the occasion of a media briefing in connection with the Silver Jubilee Celebrations of Link Natural Products, held at the "Waters Edge" on 14th November 2007.*



May I recall too that it was Jawaharlal Nehru who echoed this same philosophy when he said:

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

If you look back in recent history, western - oriented medicine was practiced then in the same manner as Ayurveda is today. It was fully based on substances of natural origin. Over the years particularly after the sixteenth century,

million people are diabetics. Over 25% of adults over 40 years are victims. Many forms of the dreaded cancers have emerged and are widely prevalent. Incidence of mental diseases, and stress related syndromes are on the increase. Many suffer from ailments of the heart, and respiratory disorders. And there are diseases which are as yet hardly identified, and caused by the very factors that have helped to increase our modern expectation of life. There are also a variety of diseases which are the result of our modern lifestyle itself, caused by atmospheric pollu-

"The Science of Life shall never attain finality. Therefore humility and relentless industry should characterize ones every endeavor, and approach to knowledge. The entire world consists of teachers for the wise, and enemies for the fools. Accordingly knowledge conducive to health, longevity, fame and excellence coming even from an unfamiliar source should be received, assimilated, and utilized with earnestness."

- Acharya Charaka

Science and Technology entered the equation, and transformed it to the powerful stature it enjoys today. Today it is able to cure a multitude of human diseases. There are powerful surgical procedures and at its disposal. The methods of diagnosis of diseases derived from the applications of modern science are most spectacular. But a very serious question begs itself? And what is that?

Is the human being of the modern world healthy? Is he or she on course to enjoy a long and healthy life?

It is a fact, that the modern life expectancy worldwide has risen from less than an average of 30 years in the 19th century, to presently over 80, in many parts of the world. However the question remains: Are people really healthy? The evidence seems to point the other way. That is, that health and wellness, given all the benefits of the modern medical machine, are on the downward trend.

For instance many chronic diseases are increasingly evident. Diabetes has reached epidemic proportions. In Asia alone about 89 mil-

lion people are diabetics. Over 25% of adults over 40 years are victims. Many forms of the dreaded cancers have emerged and are widely prevalent. Incidence of mental diseases, and stress related syndromes are on the increase. Many suffer from ailments of the heart, and respiratory disorders. And there are diseases which are as yet hardly identified, and caused by the very factors that have helped to increase our modern expectation of life. There are also a variety of diseases which are the result of our modern lifestyle itself, caused by atmospheric pollu-

tion, contaminated water, and chemical residues from fertilizers and pesticides. There are diseases too, for which there are still no cures in sight, like AIDS, Rheumatoid Arthritis and Alzheimer's disease, - just to name a few. This is hardly the scenario of happy healthy living.

As a result, in the western world, there is a formidable movement styled: "Back to the Naturals". This is in the belief that natural materials, foods and medicines included, coupled with nature-based lifestyles, benefit the human being better than any artificial mode. Now Ayurveda too has a considerable literature emphasizing natural therapy and lifestyles. Its approach and methods have stood the test of time. They would undoubtedly have within its system, cures for some of the modern ailments, which are still intractable, and incurable. Scientific research is continuously revealing this to be true.

Resulting from this, resurgence of faith in natural medicines, the worldwide industry in herbal products has reached a mark over US Dollars 100 billion, and this is not counting the values in China, India or Brazil, three of the most



populous nations. In our own country too manifestations of this movement are evident, in the increased attention to massage therapy and aromatherapy.

More recently, the formidable CIC group, recognizing the viability and potential of Link Natural Products, became a major shareholder.

“Learn all you can from the knowledge of the past, but do not imagine that the last word could have been said thousands of years ago”.

- Shri Jawaharlal Nehru

In Sri Lanka, the Ayurvedic system is well entrenched. People believe in the efficacy and safety of the medicines, and have faith in them. On the other hand the western-oriented system of medicine reigns supreme on account of its spectacular effectiveness and ready response for emergency situations. It is a powerful instrument of the national healthcare system. That is as it should be. However we have to recognize that the modern system is a transplant into our social structure and tends to, unfortunately, override sometimes, the ancient system we had. Our ancient system was not science-based, but the western system is. We have a great opportunity here to engage science into our ancient system.

The purpose of Link Natural Products was to fill the existing void. by using the valuable knowledge of the Ayurvedic system that was indigenous, and had stood the test of time, in a scientific manner. The objective was to present to the public this knowledge, wisdom and practices in a form that will fit the modern day requirement. We seized the chance to employ modern scientific methodology, in researching, developing, processing the very medicines of the traditional Ayurvedic system here.

We have thus been able to develop a range of products that are now in popular demand. The story of the success of our venture is now evident for all to witness. This day, in its silver jubilee year, the company has fully lived up to its original philosophy. Already by the year 2002 it had emerged as the country's leader in the manufacture and worldwide export of herbal healthcare and personal care products, while retaining its premier position in the production and external trade of essential oils.

Link has been the recipient of several National Awards too numerous to mention at this moment, and it is recognized the world over for the quality of its products.

We are proud of our record, built up with our own expertise and efforts, - a truly Sri Lankan venture.

The company has presently, a “clean” production facility, and a dedicated R&D laboratory complex. It is the only one, as such, in the country.

We have now the capability to present our products with confidence to international markets, with our streamlined quality control methods. However, we are also concerned about our natural resource base. We have taken steps to ensure that the endangered species of plants are conserved. Our outsourcing of cultivation and plant-propagation, engages with it the rural farmers of the country. Make no mistake! Many plants that are required in Ayurvedic medicines currently, are already on the endangered list. They may soon become extinct. It is vital that we conserve our biodiversity. The approach we have taken is firmly in this direction.

Finally, and I may leave you with this impression, that our overall intention is to be a valuable force in the renaissance of our own plant-derived herbal therapy systems. When in another twenty-five years from now, we celebrate our golden jubilee as a company, I am confident we shall have reached our goal, our distant vision, as a world leader in the herbal products industry.



# BLAZING A TRAIL IN LANKA'S HERBAL PRODUCTS INDUSTRY - TWENTY FIVE YEARS OF LNP.



R.O. B. Wijesekera

The hamlet of Dompe, where the present premises of Link Natural Products are situated, lies 40 kilometers East of the City of Colombo. It is a verdant region, characterized by high rainfall, and thus dominated by the continuous deep green canopies of its rubber plantations. Along the Giridara Road, the landscape suddenly breaks as one encounters the present imposing campus and buildings of the company.



Once the valley area of a large rubber plantation, the campus is still congruous with nature, as it houses the buildings of the Company. The Green-roofed buildings of the company, nestle among live rubber plantations on either side. The main structure houses the production facility, whilst the front part the administration, and the tail part like that of the great white shark, is dominant, with a four tiered building housing the pilot plant and production facility. The campus itself boasts a unique feature, in a variety of trees with different shades of green, all of them medicinal trees planted at the commencement of the factory with great foresight, by the former Chairman W.M. ("Wimu") Jayewardene. This indeed is a full-blown live herbarium, so valuable in the teaching of Botany and Taxonomy. This pleasant feature and the verdant surrounds do not constitute the only unique feature of the company Link Natural Products. It is headed by Dr. Devapriya Nugawela, a Research Scientist to begin with, who is the Managing Director and presently The Chairman of the Board of Directors of the Company. The Company is also the brainchild of three enterprising, at the time youthful, technocrats, the late Mr. Siripala

Jayasinghe, Mr. W. M. Jayewardene, and Dr. Nugawela himself. They were also the founders of the Link Group of Companies. This young team of visionary men, ambitious, technologically literate, and innovative, were responsible for the unique venture that is Link Natural Products, presently celebrating its Silver Jubilee Year. The institution they forged is now a landmark in the history of the island's industry.

In 2002 the company became a member of the formidable CIC group of companies. This association enabled the further expansion of the company to encompass a variety of new activities and besides, infused new management initiatives that are in accord with its expanded role in Trade and Production.

Link Natural Products first came into operation in 1982. Its main function at the time was the production of quality essential oils from Sri Lankan indigenous aromatic plants, for worldwide export. This was then an ambitious start, but was in time crowned with spectacular success. From the initial venture the company acquired expertise, not only in the associated technology, but also in the development of quality parameters, and the infrastructural requirements of total quality management, and export marketing.

By 1984, the company had ventured into the production of herbal healthcare products, based on Ayurveda and the indigenous medical system of Sri Lanka.

Over the decades the company has further expanded its production portfolio to include a wider range of healthcare, and personal care products, and in addition its own range of branded items. In so doing the company was able to develop an active and vibrant Research and Development facility, and capability in quality control and assessment. This R&D outfit, includes Ayurvedic practitioners, and more than a dozen fully-fledged scientists with qualifications in a variety of fields such as chemistry, pharmacy, agriculture, and botany. This facility is equipped with the state-of-the-art modern instrumental analytical facilities. Their capability is further augmented by access to specialized consultants who have had international reputations in regard to expertise in medicinal and aromatic plants and their processing



It is noteworthy that Link Natural was the very first herbal production company to establish a dedicated authentic R&D facility in Sri Lanka.

The philosophy of the company then was, and still remains, as follows:

*To imbibe and utilize the wisdom of indigenous knowledge and, with science and technology at the core, to produce and deliver herbal health-care products for the benefit of humanity, and to thereby develop its own national and international credibility, and export market capability.*

Now in its Silver Jubilee year the company has lived up to its philosophy. It has emerged as the country's leader in the manufacture and worldwide export of herbal healthcare and personal care products, while retaining its leadership role in the external trade with essential oils.

Among the wide range of products now manufactured by the company, for the global, regional, as well as the local market are the following:



- Standardized, Quality assured, Generic Ayurvedic preparations - (Sri Lanka Ayurvedic Pharmacopoeia).
- Branded Herbal Healthcare products based on its own R&D
- Personal care products including Spa Products.
- Spice oleoresins
- Quality assured essential oils for the international market
- Aromatherapy & Massage therapy products

Over two hundred different products are now manufactured by the company. Many of them are based on Monographs of the Sri Lanka Ayurvedic Pharmacopoeia and/or knowledge drawn from that of the ancient Ayurveda. All of them are scientifically processed according to well developed, optimized process protocols of the company. With international quality standards as its goal, the company has developed a dedicated framework and infrastructure that is unique to the country.

**This unique infrastructure includes, *inter alia* the following:**

- Trained personnel at all levels
- Laboratory and Pilot plant facilities.
- Instrumental analytical facilities
- Modern processing facilities
- Scientifically optimized process protocols for all operations (with ISO 9001,14001 certifications)
- Competence in Quality Assessment, Quality Assessment & Standardization.
- Good and safe manufacturing practices with HACCP certification.
- Methodologies for outsourcing, for procurement of authentic plant raw materials
- Methodologies for sponsoring specialized R&D in selected disciplines.
- Library information services and literature.
- A regularly published Journal - The Link Natural Products Digest.
- Competent local and international marketing services and networks
- Efficient systems for waste and effluent management
- Professional Management Services
- Ongoing Post market surveillance.



The infra - structure also includes another unique feature in the services of several external consultants who have acquired unique expertise, both locally and internationally. The company's present team of consultants are internationally recognized, and collectively, count among themselves, well over half a century of practical involvement with every aspect of the herbal products industry.

Access to such consultants, and thereby worldwide expertise, has enabled Link's R&D team to develop their own expertise to a praiseworthy extent. It is a single factor, that more than facilitates the acceptance of their products, with confidence by potential buyers, globally.



The company's first branded product was a trail-blazer, locally, regionally or even worldwide, and is now regarded as the company's flag-ship product, - the popular *SAMAHAN*. *Samahan* was a spectacular success in Sri Lanka. It was also exported directly to South India in 1999, to Singapore and parts of the US, in 2001, to Malaysia in 2002, and to North India, Canada, North America, and the Middle East in 2007.

***Samahan* is now universally acknowledged, and its efficacy and utility a byword in healthcare. It represents one leading example of the company's efforts. It is a purely indigenous product, an instant cure for the ubiquitous common cold or influenza. It is totally herbal, and the result of uniquely Sri Lankan Scientific and Technological innovation.**



From the experience of *Samahan* the company has grown in confidence and is now knowledgeable in the art and craft of introducing a product to internationally sophisticated markets like the USA, Europe, and Japan. *Samahan* is now accepted even in countries such as France, Germany, Austria, Canada, besides India, Malaysia, Singapore, and the Middle-East. This is unequivocal confirmation of the credibility of the company, among its international clientele. It is the reward for and acknowledgement of the infra-structure the company has shrewdly built up in the area of herbal products.

The recognition of the products of Link Natural as being of very dependable quality, and conforming to international standards, is a result of several contributing factors, and among them are the following:

- The use of raw materials which are authentic and of the highest quality.
- Application of standardized protocols and good practices for processing.
- Total quality management and strict quality control of final products couples with high quality packaging.

The procurement of authentic raw material of acceptable quality standards in the quantities needed for industrial-scale processing is a crucial issue in the country, where much of the raw material has to be procured from outside. Link Natural has initiated several mechanisms for outsourcing the agricultural propagation to farmers, equipping them with relevant knowl-

edge and training to maintain good agricultural practices. At the same time the company provides the farmers with authentic seedlings propagated by Research Establishments, and the Universities, and opportunities for interaction with extension service staff. Link Natural also provides opportunities for outgrowers in many parts of the island, with such appropriate knowledge and expertise coupled with a buy-back guarantee for their produce.

The majority of the staff employed at the Link Natural Products Complex in Dompe are drawn from the surrounding area. Thus the folk in the villages around Dompe, are able to find gainful employment in their home region and enjoy a justifiable proprietary pride in what to them is their own company.

Link Natural has received several awards in recognition of the quality of their operations. Among them are:

- The National Science and Technology Award (2006), for the manufacture of standardized quality Herbal Health Care Products in 2005. The Award was made by the Ministry of Science & Technology, through the National Science Foundation.
- The Presidential Award for Environment Conservation (2004). This was in recognition of the Environment Conservation Practices adopted by the company.
- The President's Export Award for 2005 for Outstanding Export Performance. Link Natural was judged the leading exporter in the field of Herbal Health Care and Personal care products by the Export Development Board to merit this award.

One may venture the belief that this is an early landmark event in the company's vision to be a world leader in the field of herbal healthcare and personal care products.

The continuing and long-term interest of the company in the herbal products industry is revealed by its sponsorship of research at the Universities and also its sponsorship of events of professional bodies such as the Sri Lanka Association for the Advancement of Science and the Institute of Chemistry, Sri Lanka. This is the company's investment for the future of its industry, to develop the fountain spring of new knowledge.

**The company truly has its eye on the future, with a growing clientele both in this country and worldwide. It has a belief and a commitment towards a better life tomorrow, blending the wisdom and wealth of knowledge of our ancient systems, with the guiding principles of modern science and technology.**



# LANDMARKS IN THE HISTORY OF LINK NATURAL

Tharanga Perera \*

Today, after twenty five years of its establishment, Link Natural is in a gallant march towards a prosperous future, with the synergy of ancient ayurvedic wisdom, modern science & technology and modern management systems. The path that lay along the quarter century history is a typical example to the way a Sri Lankan organization should develop itself, amidst numerous obstacles and challenges.

Recalling the important landmarks of Link Natural's history, one can recognize significant turning points that guided the organization towards right direction as well as a number of opportunities that were timely grasped through clever analysis of the external environment.

Following is a summarized illustration of the aforesaid landmarks, which depicts the success story of Link Natural.

## 1982

Link Natural Products was incorporated, commissioning an Essential Oil manufacturing plant at Dompe in the Gampaha District. Initially the factory was a basic, metal sheet building of 1700 sq.feet, with a staff of 07.

## 1984

Diversified to Ayurvedic sector, commencing manufacturing of Generic Ayurvedic Pharmaceuticals.

## 1992

The factory was relocated in the present venue. Constructed a modern 17000 sq.feet building complex. Staff was increased to 42

## 1993

Launched Link FiveHerbs, a herbal tea, as the first Over-The-Counter product of the company

## 1995

Marked a significant turning point in strategic direction of the company. After 5 years of research and development, launched Link *Samahan* as an instant Peyawa, first of its kind in the local market.

## 1996

Foreseeing the importance of innovations that provide maximum benefits to the customer, the company upgraded its existing R&D laboratory with state-of-the-art, high-tech equipment and instrumentation, as well as qualified personnel.

## 1997

Fulfilling the need of high quality hair oil in the local market, Link Natural launched Link *Kesha*. At a time when the market was dominated mainly by Indian hair oil, *Kesha* was a fine alternative for the consumers who preferred a Sri Lankan brand, which can compete with other brands.

## 1998

The company introduced *Link Musclegard*, which is an anti-inflammatory ointment.

## 2000

The millennium year was significant to Link Natural since it had few giant steps on its strategic direction, expanding to international markets in a higher scale, during the year. Accordingly, *Link Samahan* was launched in the South Indian market, a major victory for any local product.

Exported the first consignment of Personal Healthcare Products to the United State under the brand "Araliya". This range of products can be considered the first step in manufacturing personal care and spa products to international market.

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\* Tharanga Perera is the Production Manager at Link Natural Products



*Link Sudantha*, a herbal toothpaste was introduced to the local market.

An effluent treatment plant was commissioned to purify waste water. It is an environmental friendly technology transferred from the Industrial Technology Institute, Sri Lanka. Also it is an important step in the company's environmental management process, which is a concern of most of the international consumer groups.

#### 2001

For the standardization and implementation of Quality Management system, Link Natural was awarded the ISO 9001 certificate by SGS Ltd., with the accreditation of United Kingdom Accreditation Service.

#### 2002

New four storied Essential oil and Oleoresins plant was commissioned. It is equipped with modern equipment and machinery for increased capacities, and fulfilled GMP and other safety requirements for the products.

Further expanding the global drive, *Link Samahan* was launched in Malaysia.

ISO 14001 certificate was awarded for the implementation of Environmental Management System, also by SGS Ltd., with the accreditation of United Kingdom Accreditation Service

#### 2003

A significant move in the company's strategic path was seen as Link Natural joined hands in partnership with CIC Group of Companies.

#### 2004

Having recognized the importance of knowledge sharing as a prospective global player in the herbal products industry, the company launched the inaugural issue of its biannual periodical, Link Natural Products DIGEST.

#### 2005

Link Natural Gotukola tea- another herbal tea- was launched

New two storied welfare building was commissioned providing improved facilities for employees. The complex includes changing rooms, sanitary facilities, fully equipped canteen, modern auditorium, a library and sports facilities.

The company won the Presidential Award for Environmental Excellence for the Year 2004

#### 2006

Won the award for the best standardized ayurvedic pharmaceutical manufacturer of the year, from National Science Foundation

Link Natural Swastha Triphala was launched to the market. It is an alternative for conventional Triphala powder used for a long time in Ayurveda system.

Started manufacturing of wellness Product range for Banyantree spas of Thailand. The Banyantree, which has a chain of spas located in a number of countries, is a gateway for Link products to the world market

#### 2007

*Link Samahan*, which revolutionized the treatment of cold and cold related ailments, received prestigious "Superbrand" status for being one of the strongest brands of Sri Lanka.

Fulfilling the need for an easy to use, high quality product for the segment that seeks traditional remedies, Link Natural Enriched Paspanguwa was introduced in to the market.

Obtained the HACCP certification for implementation of programmes to ensure the safety of products, thus enabling the company to fulfill the requirements of the market of developed countries.

*Link Samahan* was launched in North India

**Link Natural won the Presidential Export Award for outstanding export performance of Herbal and Health-Personal care Products, for the year 2005**



# LIFE BEGINS AT LINK.

## The Experiences of a Trainee Manager.

V. P. Malmee Neranjika.\*

Link Natural Products (LNP) is an organization of Sri Lankan origin, which was initially engaged in the production of natural essential oils from local spices and herbs. This was in 1982. In time they were quick to see the potential of Ayurvedic pharmaceuticals and herbal health care products and the company was to diversify their range to include these. These products are now largely produced by using a proper combination of traditional methods and modern technology and by following good manufacturing practices and quality management procedures. They have already identified the niches, and now use those traditional Ayurvedic methodologies, combined with the advantages of new technologies, to cater for the busy people, giving them products, with the safety of Ayurveda, and the certainty and reliability that come with good quality control. They are also convenient as remedies to take, unlike the old traditional preparations.

The LNP family experienced a very joyous occasion recently. It was selected as being the foremost herbal exporter for the year 2005. This is further proof of the strength of LNP's position, and its recognition in the overseas markets.

I joined Link Natural as a fresh graduate, through a well-organized recruitment and selection process. This comprised evaluation of knowledge, skills and personality. The senior management had decided to bring in management trainees who possessed both academic and professional qualifications in to their organization. Link Natural has recognized the importance of investing in human resources, in line with multinational giants of the day, and work towards achieving their mission.

LNP directed us to a well-organized, multidisciplinary training program, because they have identified the importance of training in developing a multidisciplinary mind-set in young managers, in the future. Our present training is being coordinated by an experienced and competent team of experts of the Link

Natural family. They have had the benefit of having regularly attended both international and local seminars and training programs, with the purpose of updating knowledge and experience.

While undergoing training within this knowledge based company, I sensed that it is a place which has a science engine within the heart of its innovation and the rigor of science, which is able to deliver guaranteed quality products. This can be identified as their trademark, and is characteristic of their entire product delivery process. Therefore in my opinion, the sky is the limit for me in building up my career at Link Natural, with great possibilities at hand.

I am proud to say that the experience and the exposure that I gain from Link Natural, will be far ahead compared to what I may obtain from any other comparable institution in the corporate world. I look forward soon, to the opportunity of putting my newly acquired expertise to practice.

This year, the Link Natural family is celebrating its 25th anniversary. I am confident that we shall enjoy a bright and prosperous future at Link Natural.

### Economic Realities.

In the twentieth century almost everyone in almost every country works for money, and use the money they earn to buy the things they need, and want to make a good life. Hardly anyone can have a good life without money..... Even those who are more concerned about the work they do than the money they earn from it, or about where they live, require some money to live.

Charles van Doren in  
"A History of Knowledge."

\* The author is presently a Management Trainee at Link Natural



## EDGAR LEDERER – Father of Modern Chromatography.

R.O.B. Wijesekera

The original inventor of the technique now known as "chromatography" in so many forms was the Russian botanist-chemist M. S. Tswett. His researches during 1899-1906, culminated in his now celebrated Warsaw Lecture, in which he described the separation of pigments using a column packed with calcium carbonate. For a very long time since then the technique was of little value to chemists, or scientists in general.

By 1928 scientists had known of the existence of the pigment carotene, as well as its connection with vitamin A. In Switzerland the Nobel Laureate Paul Karrer, had proposed a structure for the compound carotene. However the brilliant Austrian scientist Richard Kuhn working in Heidelberg University, with a young Austrian colleague named Edgar Lederer had obtained results that were contrary to the structure put forward by Karrer. Kuhn thought that either Karrer's structure was wrong, or the compound that his young colleague Lederer had obtained was a mixture. Kuhn suggested that Lederer adapt an old technique called "chromatography" that had been abandoned by chemists, in order to ensure that the purification of carotene was complete. Lederer refined the method, changing the adsorbing materials and the solvents, with markedly improved results. He was also able to purify carotene and in 1931 he obtained two isomers which Kuhn and Lederer called alpha and beta carotene. Later he isolated a third form, gamma carotene. The publication of an article in March 1931 on the separation of alpha and beta carotene, by Richard Kuhn and Edgar Lederer, is now commonly regarded as the **birth of modern chromatography**.

Lederer's work is the most significant milestone in the development of modern chromatography while at the University of Heidelberg the pediatrician Paul Gyorgy asked Kuhn, to isolate Vitamin B2 - which had been discovered in 1926, by Goldberg, - from the rat livers he had been working on. The collaboration between Kuhn and Gyorgy grew, and they expanded their work to isolate and characterize

Flavins, in yeast, heart muscle and other sources. Flavins are widespread pigments in nature, but exist only in minute quantities. So the isolation was a monumental task, not achievable by the conventional methods of the day. In fact, purification of a single gram of the "beautiful yellow substance" as Kuhn was to describe it, ( which actually came to be called Riboflavin), required 5000 litres of milk or the dried albumin from 34,000 eggs. At this time the youthful Lederer, and his newly devised method of chromatography, were the key instruments of Kuhn's success.



As a Jew, with distinctly left-wing political leanings, Edgar Lederer was forced to flee to France in March 1933. The Gestapo was fortunately four days too late, when they came to arrest him. Lederer had married a French lady, (and this probably saved him) and he was committed to living a simple peasant's life till the end of World War II. He told this author that only when his fifth child was born was he freed from the life of a labourer, which for him meant *inter alia*, brushing the horses of his employers.

After WW II, France could not compete with Britain, Switzerland and the US in research on Natural Products. At the Universities, Chairs were not allocated to Research on natural products, this function devolving around the Faculties of Pharmacy. French natural products chemists were very few and had to obtain their training in Switzerland, which boasted among others the celebrated Nobel laureate Leopold Ruzicka. This was the fate of Edgar Lederer too and he worked for the French firm, Firmenich et Cie and under the supervision of Ruzicka, who was a consultant. In time he became co-Director of the Centre Nationale Recherche Scientifique,



(CNRS), together with M-M Janot, and commenced again his work on Natural Products. He did joke about the fact that he was nominated a Professor "without chair" as the Chair was only created in 1958.

In 1960 this author had the privilege of meeting this uniquely great man in Colombo, when he visited the country en route to the IUPAC symposium in Australia. He delivered a brilliant lecture, with all his characteristic humour, to the Chemical Society of Ceylon on the Chemistry of the Queen Bee substance, which he and his group had just unraveled. Lederer researched on a wide variety of natural products which included colouring pigments, biologically active substances, and bitter principles of plant origin.

The late Gilbert Wijesinha of the Medical Research Institute had worked with Lederer in 1959, at the CNRS at Gif-sur-Yvette, and Lederer presented his double volume on Chromatography, authored with his cousin Michael Lederer to him. The volume inscribed by Lederer is at the Medical Research Institute Library.

From that point this author himself was a collaborator with the CNRS group at Gif, and together with the Lederer Group worked on *Samadera indica*, and *Holarrhena antidysenterica*, isolating several compounds such as Samadarines A-C and Mytiphilline, a steroidal alkaloid, the structures of which were unraveled by collaborators at CNRS such as Judith Polonsky, Robert Goutarel, and Guy Ourisson. Several Sri Lankans, G.P. Wannigama, and Lakshmi Arambawela among others, worked with the CNRS group. The author was a guest at CNRS in 1972, and since then was honoured to be counted by Lederer as a friend. He visited the Lederers in their home in Sceaux, a suburb of Paris. Professor and Mrs Lederer visited Vienna, in 1983, and we were happy to take him around the city he grew up in. This was his first visit since fleeing from that country. He was delighted to revisit his old haunts and this simple man recalled with nostalgia and a sense of sorrow as well, some of his pleasant as well as traumatic experiences. One such pleasant one was his penchant for his favorite dessert, Palaschinken, which he enjoyed immensely on that occasion. He was awarded the CNRS Gold Medal in 1974.

Lederer died in 1988. But he was greatly appreciated in France, and all over the world. Lederer was succeeded at the CNRS by Sir Derek Barton FRS and Nobel laureate.

## TAMARIND - AN ASIAN SPICE WITH AFRICAN ORIGINS!

- Keara

Did you know that the ever present spice of our Asian kitchens originated in East Africa? The popular Tamarind (Sinhala: Siyambala, Tamil:....) and botanically known as *Tamarindus indica*, is actually a native of Africa. Its name derives from the Arabic tamr hindi, which means literally "date of India". Today it is cultivated universally in the tropics.

The tamarind spice comes from the fruit pod of the large evergreen tree found in the southern states of India and in Sri Lanka. The fruit pulp is a constituent of most of our curries. The pulp has no particular smell but has a characteristic sour taste, and differs to all other such alternatives like lime and vinegar. It has a different array of organic acids and these are responsible for its unique taste quality.

Tamarind is also used in modern Asian cuisine to make spicy sauces. Whereas in India and Sri Lanka the ripe fruit pulp is used. in the Vietnamese and S.E. Asian cuisine the unripe fruit is preferred.

Tamarind is used in Ayurvedic medicine too and has the reputation of being cooling and anti-billious. It is also used in the treatment of respiratory disorders and ulcers.

**Source :** V. Kumar : (2006). The Secret benefits of Spices and Condiments. New Dawn Press Inc. India, USA. 2006.





## PERFORMANCE OF ANALYTICAL LABORATORIES - A Case for Proficiency Testing of Analytical Laboratories

A. Lakshman Jayewardene, Ph.D. \*

Starting with the assumption that a laboratory (lab.) has one or more analytical methods for measuring the concentration of analytes or impurities or toxic substances in numerous matrices, for eg. natural water, essential oils, food materials, soil/earth, etc, let us look at the basic requirements that will ensure the results generated are accurate and precise to an acceptable degree and truly the analyte(s) and not some interferences were measured.

It is best to illustrate the basic requirements using a simple example such as the determination of Eugenol in cinnamon leaf oil or clove bud, leaf or stem oils. The method of choice will be gas liquid chromatography (GLC) with detection by flame ionization (FID) or even mass spectrometric detection (MSD). The natural matrix for each of these will be the whole essential oil and in the present instance the eugenol can be removed more or less completely by dilute alkali wash. The filtered and dried eugenol free oil is the best blank matrix one is able to obtain for preparing two absolutely essential items for all good quantitative methods. They are the calibration standards and the quality assurance control samples (QA/QC samples). These two sets of samples need to be prepared in the present example by adding accurately known amounts of pure eugenol in to the blank matrix, and range of concentration depends on target concentration range of the various oils. Taking cinnamon leaf oil as the test product the range of eugenol content will be 50 to 90% w/v. In order to cover this range the calibration curve should span from 40 to 95g/100ml of eugenol in blank matrix. Usually at least two levels of QA are analyzed along with the unknown samples in the same batch, one low control at about 55 to 60g/100ml and a high control at 75 to 80g/10ml.

Once a lab has developed a suitable method and formalized all the parameters, made sure that no interferences are causing problems (usually by analyzing a large selection of product samples from archived samples), the next

step is to determine accuracy and precision by running sets of QA controls (5 or 6 aliquots) at low and high concentrations with a set of calibration standards for each run. For statistical validity, between assay validation (interassay) requires at least 30 data points (i.e 5 aliquot over six different days or 6 over five days). This step will tell the analyst if the method is producing results which are accurate (how close to the expected concentration) and precise (how consistent the data is with the average of the results) over a period of time. The within day (intra-assay) validity is also calculated for each of the days and a range of accuracies and precision data are recorded. This will tell one the variability over a short time of a single batch. The accuracy should fall within +/-15% of the target (expected) concentrations for both the calibrators and the QA samples. Similarly the precision is reported as percentage-coefficient of variation (CV%, which is standard deviation divided by the mean of the results) should fall within +/-15%. These results need to be tabulated and a document prepared with other pertinent information such as stability of the analyte(s) over a period of weeks, months and even years. This document is called a Method Validation Report (MVR). A second document to accompany this one is a compilation of the analytical details used to generate the above data, including but not limited to sample preparation, preparation of calibrators and QA samples and for our example the GLC parameters used and copies of the blank and calibrator chromatograms etc. This is the Standard Operating Procedure (SOP) document. It is customary to have these two reports reviewed by one or more quality control personnel or an experienced outsider, or both.

There are many aspects of the validation process which can be different for different types of applications, for instance in industry (our example), clinical pharmacology where human subjects are involved and therapeutic drug monitoring (TDM) where real time sample analysis is required for dose adjustment of medications



(much narrower limits specified for accuracy and precision) while in pharmaceutical industry the drugs are tested for purity and impurity levels etc, each has different set of specifications.

Once a lab. is assured of a satisfactory method for determining concentrations of one or more analytes in samples the method can be applied to unknown samples from the field or the factory. Over a time period small things can change for eg. a large batch of calibration standards prepared an year or more previously may slowly diminish in quality and unless some fresh accurately made samples are obtained for a quality control check the lab. will not detect any errors in the calibrators or any other changes in instruments etc. This type of QA check sample testing is designated as proficiency testing. The most important thing with proficiency testing (PT) is that the concentrations of analytes are accurately known but the laboratories undergoing the testing do so as unknown samples just like actual industry/factory or clinical samples (i.e sample concentrations are blinded). In fact the US-FDA requirement is that the PT samples are assayed within a batch of actual samples whenever possible. The results are separately reported to the independent source which supplied the PT samples. A final report is generated showing the accuracy and precision of each lab based on the theoretical (expected) value and the measured mean value for each analyte concentration. Again the +/-15% acceptance criteria are applied and deviations from these are flagged and individual labs are required to indicate the reasons for deviations and corrective actions taken to rectify any problems. For example if the bad results were due to failing calibrators obviously the analyst will have to make fresh calibrators and QA samples, and re-measure the PT sample concentrations and make sure the values agree closely with true values.

The importance of proficiency testing for analytical laboratories cannot be overstressed. There are many critical areas where the results of assays may be one of or sometimes the only criteria used in decision making processes. For example toxicology, forensics, law enforcement, TDM in pharmacology and sometimes treatment regimens are based on analytical results (cholesterol levels in patients and treatment with statins). Pesticide residues in food product and mercury in water and fish, where traces are found if quantitation is inaccurate the results can cause far reaching consequences.

How can we make sure that any analytical results which laboratories produce are truly accurate and precise to the best possible extent? Absolute calibration while possible in many physical measurements is almost impossible in chemical substances, so the best alternative is to undertake proficiency testing periodically (bi-annual). The strict regimen of analyzing QA/QC samples along with unknown samples helps a lot in keeping quantitative results as true as possible. The values that a lab. provides a client for his product is taken by the supplier and purchaser as being accurate. If there is dispute regarding your lab's results, compared to a reference lab, it is always good policy to have the support of periodic proficiency testing results.

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" A shortcoming of Ayurvedic Drugs is the lack of suitable quality control standards resulting sometimes in difficulties in ensuring uniformity of their composition and consequently efficacy of the final products. The fact that many drugs are composed of a number of ingredients does present difficulties in conventional quality control assays, but by using modern techniques, including 'finger-printing' and bioassay, of one or more major constituents/active ingredients, of the drug, their standardization is possible on a scientific basis.

**Dr. Nithya Anand**

Former Director, Central Drug Research,  
Lucknow, INDIA.

Chinese Medicine is a great treasure trove.  
We must make all efforts to uncover it and  
raise its standards.

*Mao Te dong.*



# THE MYSTERIOUS "CURD" COCONUT (MAPHRAO KATHI, DIKIRI-POL, OR MAKAPUNO)

Narong Chomchalow \*

## ABSTRACT

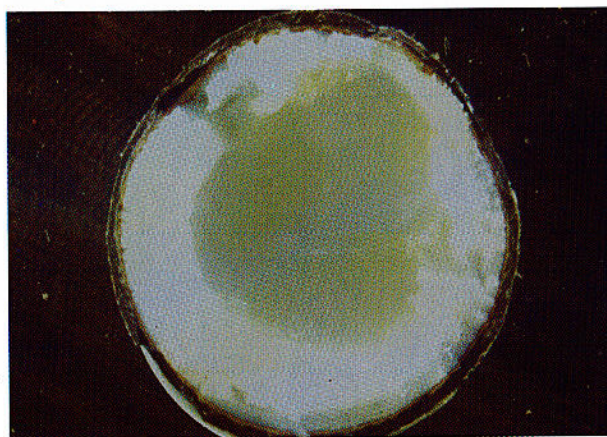
Maphrao Kathi (MK), identified in Sri Lanka as Dikiri Pol, and in the Phillipines as Makapuno, is the fruit of the coconut palm in which the meat is "fluffy". It is considered a delicacy by the native people of nine countries. Its origin is a mystery, as these fruits are borne on coconut palms which appear normal in other respects. The majority of fruits from MK yielding palms are normal only a few being MK. Two types of MK fruit exist "Kao Chao", with less fluff, and Khao Niao with maximum fluff. The palm is self-pollinated and the yield of normal: MK fruit is in the ratio of 3:1. It is hypothesized here that MK is controlled by a single recessive gene where the mother plant is a heterozygote in which the dominant character is normal. The MK fruits are borne on tall palms which are cross-pollinated. Their production is therefore dependent on pollination from another heterozygous plant, which also produces recessive genes.

Through embryo culture techniques true breeding MK palms have been developed, and grown as pure stand on an isolated island in Kanchanaburi, in Thailand. All fruits produced are MK as expected. A scheme to develop dwarf X MK-hybrids has been developed by the Thai Department of Agriculture. Crosses were made using pollens from selected palms of the true-breeding MK palms, and crossed with four selected cultivars namely: "Nam Hom" - aromatic water, "yellow Malayan dwarf", "Red Malayan dwarf", and "Thung Khlet" The F1 hybrids of all are semi-dwarf. As dwarf palms are self-pollinated the F2 populations exhibited a 3:1 ratio.

As income obtained from selling MK fruits is ten times higher than normal fruits the farmer is expected to earn an income 2.25 times higher. Further prospects can be derived by pollinating the F1 hybrids with pollens from true-breeding MK palm in which a 1:1 ratio of normal : MK is expected. This would give rise to a higher income of 4.5 times. Besides, all the normal appearing fruits are heterozygotes which can be

used to be grown for commercial production of MK dwarf palms. As Thailand is the only country in the world that has 'Nam Hom' cultivar, the aromatic water-MK fruit is certainly a bonus in the MK palm production since it adds aroma to the already delicious fluffy meat.

Keywords: Fluffy meat, 'Khao Chao', 'Khao Niao', embryo culture, hybrid, heterozygote, 'Nam Hom'.



## 1. INTRODUCTION

Maphrao Kathi (MK) is a Thai word for an abnormal mature coconut fruit having fluffy tender endosperm (or meat) with little or no viscous water remaining in the fruit cavity. In Sri Lanka it is identified as "Dikiri-pol" (Peries 1996) Among the 90 countries in which coconut palms are grown, only nine countries have MK. These are:

Country	Local name
1. Cambodia	Dong Kathi
2. India	Thairu Thengai
3. Indonesia	Kelapa Korpjor or Korpyor
4. Malaysia	Kelapa Korpjor or Korpyor
5. Papua New Guinea	(Moon eat)
6. Philippines	Makapuno
7. Sri Lanka	Dikiri pol
8. Thailand	Maphrao Kathi
9. Vietnam	Dua Sap

\* Chairman, Thailand Network for the Conservation & Enhancement of Landraces of Cultivated Crops, (TNCEL)  
e-mail<narongchc@au.edu>



## 2. THE MYSTERY

### 2.1 Unusual mode of inheritance :

MK is naturally borne on a normal-appearing tall coconut palm where only a few fruits are MK while the majority is normal fruit. As the MK fruits do not germinate, propagation is traditionally done by germinating normal fruits from the MK-yielding palm, which may or may not yield MK fruits after eight years of planting.

### 2.2 Is MK a Variety of the Coconut?:

There are two schools of thought:

#### 2.2.1 MK is not a variety of the coconut :

This is evident from the fact that it is :-

- Borne on the same bunch with normal coconut
- Occurs at low frequency and does not occur in every fruit of the same tree
- Does not germinate, thus cannot reproduce itself
- No true-breeding individual exists

Some think that it is caused by a disease, but its casual organism is unknown. Perhaps it is caused by a virus or a mycoplasma. Some think that it is caused by a mineral deficiency, or by exposing to abnormal environment. But none has a definite evidence to prove its hypothesis.

#### 2.2.2 Mk is a variety of the coconut :

This is evident from:

- When a normal fruit from an MK fruit-bearing palm is planted, it sometimes yields MK fruits

### 2.3 Its origin was a Mystery:

Although the farmers know how to propagate MK, no one could explain its origin. It was believed that MK is borne on the eastern side of the palm, while another view maintains that it is borne on the western side. Both are sometimes correct.

## 3. TYPES OF MK

Based on the thickness and softness of the meat , and the amount and viscosity of the water in the fruit cavity, MK can be arbitrarily classified into the following categories:

*Khao Chao Mk (non-glutinous)* : Meat thickens and softness having a little viscous water.

*Khao Niao MK (glutinous)* : Maximum thickness and softness of meat, and maximum water viscosity

There are, however, a graded series of meat thickness and softness , and the amount and viscosity of the water. Three factors are involved in the formation of fluffy meat and viscosity of the water. These are:

#### (a) The age of the fruit at harvest:

- If the fruit is harvested prematurely, the meat is still not fully developed into fluffy meat, while there is still a lot of not-so-much viscous water in the fruit cavity . This type is the so -called, "Khao Chao".
- If the fruits is harvested at a proper age, the meat tends to develop in full fluffy stage while only a little amount of viscous water remains in the fruit cavity. This is the so called, "Khao Niao".

#### (b) The storage period after harvest:

- For prematurely-harvested fruit:
  - If the fruit is kept for a short period of time, it still maintains the status of "Khao Chao"
  - If the fruit is kept for a long period of time , it becomes "Khao Niao".
- For fruit harvested at proper time:
  - If the fruit is kept for a short period of time, it is in the status of "Khao Niao".
  - If the fruit is kept for a long period of time, all the fluffy meat disintegrates; this stage is called "Duean Kin" (The Moon Eats)

#### (C) The growing condition :

- If the palm is grown in rather poor condition, the meat becomes less fluffy. It is of the type of "Khao Chao".
- If the palm is grown in an optimum condition, the meat becomes fully fluffy. It is of the type of "Khao Niao".

## 4. THE HYPOTHESIS ON THE ORIGIN OF MK

### 4.1 The Observation:

- MK occurs in a particular coconut palm, and only in some fruits.
- Its cause is considered by some to be disease, but no casual organism has been found.

### 4.2 The Experiment and Conclusion:

- Controlled self-pollination of an MK-producing palm yields a 3:1 ratio of normal: MK progeny (Zunica, 1953).



- Thus it is concluded that MK character is controlled by a single gene in which MK is recessive-k, and normal character is dominant -K.
- As the MK fruit(kk) cannot germinate, all MK-bearing palms are heterozygote(Kk).

## 5. PHYSIOLOGICAL BASIS OF MK

### 5.1 Why the meat of MK is Fluffy?:

MK nuts have different cell wall materials and the component sugars of each fraction of the hydrolysis product varies between MK and normal nuts. Having three recessive genes(kkk), the MK endosperm may well be a case of cell dedifferentiation occurring on the plant itself (Kovoor, 1981). Through cytochemical studies, Sebastian et al. (1987) was able to confirm that there were cellular cytochemical differences between the endosperm of normal and MK nuts. Such differences support the abnormal and tumour-like character of the MK cells. In addition, they were of opinion that an increasing concentration gradient of oil globules and protein bodies towards the testa suggests the early synthesis of these organelles during endosperm development.

### 5.2 Why the MK Fruit Cannot Germinate?:

Chomchalow (2006) postulated that MK endosperm (kkk) cannot produce the enzyme galactomannanase to digest galactomannan to produce mannan. Thus, it contains galactomannan which is viscous, but is not a food of the MK embryo. Consequently, it dies eventually. Galactomannan is responsible for the fluffy texture of MK.

## 6. EXPLOITATION OF THE KNOWLEDGE

### 6.1 Embryo Culture to Obtain Homozygous Line of MK:

MK embryo can be cultured in aseptic condition until the plantlet is big enough to be transplanted in the nursery. Upon growing this cultured embryo to fruit bearing stage, and upon self-pollination, MK fruits are produced 100% (De Guzman, 1960). A commercial firm in Thailand has planted 2000 tissue culture plants on an isolated island in a reservoir in Kanchanaburi Province in western Thailand. They are now producing 100% MK fruits.

### 6.2 Hybridization to Obtain Dwarf F1 Palms for Commercial Production of MK:

A hybridization scheme has been conducted by the Thai Department of Agriculture. Pollen sources are from embryo-cultured MK palms while maternal parents are four dwarf cultivars, namely 'Nam Hom', 'Thung Khlet', 'Malayan Yellow Dwarf', and 'Malayan Red Dwarf'. The F1 hybrids are mostly semi-dwarf (which is self-pollinated in nature) in stature; they all produce 25% MK fruits as expected. The most interesting cross is that with 'Nam Hom' in which 56% have aroma water (Wattanayothin, 2005).

### 6.3 Backcrossing F1 with Homozygous Line to Double the amount of MK:

Chomchalow (2006) postulated that if a backcross is made between the semi-dwarf F1 with the MK homozygous embryo culture palms, the resultant offspring would yield 50% MK fruits which doubled that of the F2 which yields only 25% MK fruits.

## 7. BENEFITS OF MK

### 7.1 Nutritional Value of MK:

Not only are MK fruits delicious, they are also nutritious, and health promoting. Upon chemical analysis, CC has 93.3% saturated fatty acids (SFA) compared to normal palms of about 90% (Chomchalow, 2006). It is now well known that SFA is health promoting contradicting the earlier belief that they cause heart disease (Wickramasinghe, 1984). It has also less unsaturated fatty acid, both mono (5.5%), and poly (0.8%), in contrast to normal palms which have about 10.3% mono - and 2.3% polyunsaturated fatty acids (Chomchalow, 2006). It is now known that unsaturated fatty acids are hazardous to health, in contrast to earlier belief.

### 7.2 Demand for MK:

MK is always high on demand because people love to eat MK as desert, even at the price ten times as much as ordinary coconut. MK can also be industrially processed into various food products including ice-cream, pie, bottled or canned desert (Chomchalow, 2006).

### 7.3 Benefits to the Growers:

Assuming that a coconut palm yields 100 fruits per year (in reality, it is higher), a grower who grows F1 hybrid dwarf palms will obtain, through self-pollination, 75 normal fruits and 25 MK fruits (3:1 ratio). Based on the assumption that MK fruit fetches ten times as much as the



ordinary fruit. (Chomchalow, 2006), MK grower earns  $(1 \times 75) + (10 \times 25) = 325$  units of money, while ordinary coconut grower earns  $(1 \times 100) = 100$  units of money (a unit is to the price per coconut fruit). Thus MK grower earns  $325 - 100 = 225$  units or 2.25 times more if they grow F1 hybrids. But the income will double if he makes backcross of the F1 hybrid by using pollens from homozygous embryo culture MK palms to obtain a 1:1 ratio in the progeny, instead of a 3:1 ratio. By simple calculation, the income of MK grower would be  $(1 \times 50) + (10 \times 50) = 550$  units of money. This is  $550 - 100 = 450$  units or 4.5 times more than that of ordinary coconut grower (of 100 units). Adding the fact that a hybrid normally yields 20% higher than the purebred, the income would be 540 units or 5.4 times higher.

## 8. EPILOGUE

The Thai Department of Agriculture is now able to produce 1,000 nuts per month of the F1 hybrids of the four crosses mentioned earlier for sale to the farmers on a first-come-first-serve basis at a very cheap price of Baht 30 (about 1 US \$) per seedling. Within three years time, all these seedlings would bear fruits, one fourth of which will give MK nuts. Of the remaining three-fourths normal looking nuts, two parts are heterozygotes, and can be used as planting materials for the next generation. This is a special case of hybrids producing true to type hybrids for planting.

By the time these first lot of MK hybrid start to produce fruit, large amount of embryo culture palms would be grown. These would provide a good source of pollen to pollinate the F1 palms so that the progeny is expected to give a backcross ratio of 1:1, instead of an F2 ratio of 3:1. In such a case, half of the nuts is MK while the other half is heterozygous which can be used as planting material for the next generation. This has one distinct advantage; the farmer does not have to take one of three chances of planting a normal coconut, as all the normal-appearing nuts are heterozygotes!

As Thailand is the only country in the world that has 'Nam Hom' cultivar, the aromatic water-MK fruit is certainly a bonus in the MK palm production since it adds aroma to the already delicious fluffy meat.

It is hoped that within ten years, Thailand would become the world largest producer and exporter of MK coconut.

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Medicinal Plants and Traditional Knowledge Associated with them will acquire even greater importance as biotechnology makes headway and these plants will help in tackling many diseases.

**R. A. Mashalkar D. G. CSIR. India**

Odour, and Taste, form a common Sense, with the Mouth as Laboratory, and the nose as Chimney.

**- Anthelm Brillat-Savarin 1755-1826  
French Gourmet, and culinary expert.**



# GARLIC -A TRADITIONAL CULINARY, & MEDICINAL HERB, WITH A NEW CELEBRITY STATUS.

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## 1. HISTORICAL BACKGROUND

The herb Garlic has enjoyed celebrity status as a legendary healing agent since Neolithic times. It figured prominently in the earliest of medical records. A 5000 year old Babylonian cuneiform tablet, refers to garlic as a medicinal tonic. The early Egyptian medical manual, now referred to as the Ebers Papyrus, lists no fewer than 22 different formulations of drugs, with garlic as an ingredient. The medicinal virtues of garlic have been inscribed on the great pyramid of Cheops, as it is reported that the builders of the pyramids were regularly given garlic to maintain their stamina and keep then off disease.



Egyptian Royalty, and Nobility, were evidently buried with garlic, presumably to protect them in after life. The remnants of bulbs of garlic have been found in several excavated tombs, including that of the Pharaoh Tutankhaman, who was buried in 1352 BC.

In addition, garlic has enjoyed a similar status in the culinary arts as a flavour enhancer in foods.

In Europe too garlic was a revered medicinal agent, and even as a component of gourmet foods.

It is referred to in several religious works including the Bible, the Talmud and the works of Mohammed. The ancient Romans, Greeks, Turks, and the civilizations of the Indus valley,

and the Chinese civilization recognized the values of garlic. Extending from these geographically diverse ancient civilizations, through medieval to modern times through one unbroken timeline, garlic has been a valued component of mankind's therapeutic armory, as well as his diet.

The plant's value has been acclaimed by physicians of the past within all cultures. It has truly had a celebrity status up until even modern times. It is also the favorite of chefs.

It was in 1858, that the great scientist Louis Pasteur, for the very first time, described its anti-bacterial properties. Since then, and in modern times researchers have described the nature of the amazing potency of garlic, and its ability to respond to a bewildering array of human ailments. Researchers have also shed light on the intricate chemistry of the substantive constituents of garlic, and the array of sulfur containing compounds released when garlic is cut or damaged. Recent therapeutic studies are beginning to understand and even confirm the monumental faith in garlic over the millennia.



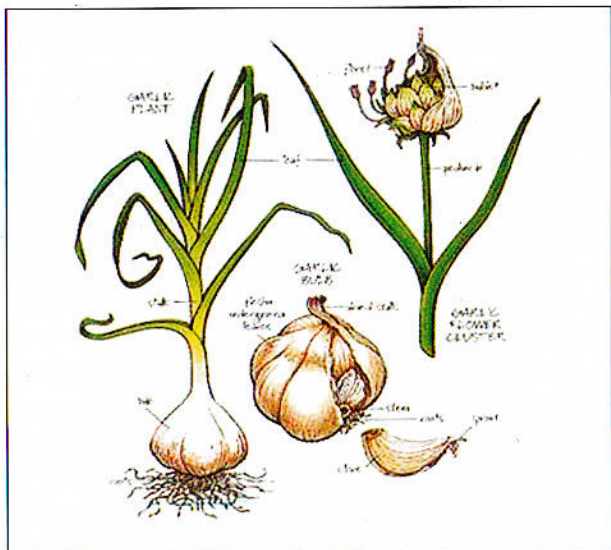
Louis Pasteur in his Laboratory

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## 2. BOTANY, CHEMISTRY & PHYSIOLOGY



Garlic is a member of the Lily family of plants. It has been classified by Linnaeus as belonging to the family Liliaceae and the genus *Allium*. The genus *Allium* contains over 600 species that includes : onions, scallions, shallots, chives and leeks. (vide LNP Digest Of Onions & Tears)

The pungency that characterizes the members of the *Allium* genus, is due to the variety of organic sulphur compounds released, by enzyme action when they are damaged or cut.

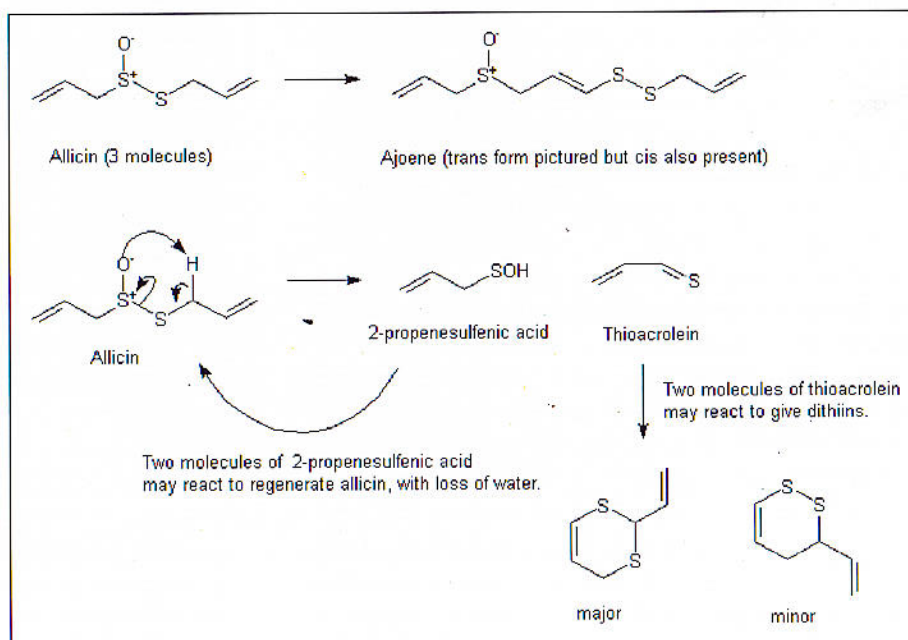
Garlic is botanically identified as *Allium sativum*, and is closely related to the onion *Allium cepa*, and its chemistry is of similar. Both these species, abound with an array of the sulphur containing compounds, which presumably prevent the plant from being eaten by pests, thus serving as the defensive mechanism of the plant. These compounds are mildly toxic to humans as well, if consumed in very large quantities, and the usual advice is that no more than 5-6 of garlic or 3-4 large onions should be consumed in the raw state at a single sitting.

The reputed healing properties of garlic too, are due to these sulfur containing compounds that are released by enzymic action whenever the bulbs of garlic are crushed, damaged or cut.



Alliin which is (+)-S-allyl-L-cysteine sulphoxide and is the compound inherently present in the garlic bulbs, is converted by the action of the enzyme allinase, to 2-propene sulphenic acid; this then dimerises, to give rise to allicin, which is 2-propenyl-2-propene thiosulphinat. This is the major odoriferous compound of garlic, which also gives rise to Ajoene, which is an anti-thrombotic agent. which inhibits the formation of platelets and is reckoned to be as effective as aspirin in that respect.

### Reactions of garlic constituents and derivatives



Understandably researchers over the years have focused attention on the chemistry and the pharmacology of garlic with a view to maximizing our understanding of the reputed healing properties.



Among several of the major research groups that have been responsible for our understanding of the complex nature of the chemistry of garlic, are the following.

1. The group led by Professor Arthur Stoll at Sandoz Pharmaceuticals, Basel, Switzerland, 1940-1950.
2. The group of Professor Artturi Virtanen of the Biochemical Institute, Helsinki, Finland, 1950-1960.
3. Professor Eric Block & coworkers at the State University of New York, Albany USA, 1970-1990 and,
4. Dr. Heinrich Koch, and team at the University of Vienna, Austria, 1980 - 1990.

Intact bulbs of garlic have only a comparatively mild odour, and are not noted to display any major physiological activity. When they are damaged and the enzyme allinase acts on the constituent compounds like the odourless, allin, a series of other sulphur containing entities such as allicin are formed and it is these compounds that give it its characteristically pungent odour as well as its reputed therapeutic properties.

Analogous reactions occur in the case of onions too. (*Vide: Link Natural Products Digest Vol 2(1) 2006*)

The formation of the thio-sulphinates gives rise to a whole cascade of chemical reactions that occur in crushed or cut garlic or onion bulbs. Reactions with the aerial oxygen and with other compounds formed result in an eclectic range of organic sulfur compounds. This range includes some of the compounds which are the cause of the offensive odours as well as those with the most significant physiological activity.

The characteristic "lachrymatory", or tear-inducing effect, is attributed to syn-propanethial sulphoxide which too is initiated by enzyme action of allinase on alliin and isoalliin.

The wide variety of compounds formed as a result of the initial enzyme action brings about several after effects. When garlic is consumed it causes what is termed "halitosis" or simply, garlic breath. The bad breath, and perspiration odours are also the consequence of the cascade of compounds formed when the thiosulphinates react with atmospheric oxygen. Paradoxically, as it may seem, these self-same compounds are the ones that come to the rescue of humans in preventing as well as healing a variety of ailments.

It has also been recorded that the allinase reaction occurs in the presence of water only. It could

be arrested by drying or with the use of a solvent like alcohol which deactivates the enzyme. This fact is made use of in the formulation of the many garlic preparations that are registered as nutraceuticals. For example, garlic powder is produced by drying after cutting into pieces, or by pressing out the juice and spray drying, and the resultant powder contains much of the precursor Aliin, as well as the enzyme. It is quite close to the fresh garlic. The formulation of supplements made from garlic powder presents a daunting task as the active compounds like allicin tend to decompose during storage.

Culinary garlic powders are made by drying the macerated garlic. Although this is the most cost-effective method of producing garlic powders the resultant product may not be so suitable in respect of the antibiotic properties which come from the relatively unstable allicin.

### 3. THERAPEUTIC EFFECTS

Quite a number of recent researches on Garlic confirm its general utility in combating various ailments and tend to authenticate the traditional claims. Researchers like Larry Lawson of the Plant Bioactive Research Institute, Orem, Utah, USA, and Eric Block of the State University of New York, have recorded convincing evidence of the efficacy of garlic.

It has been confirmed by modern scientific research that garlic displays the following effects. (*vide in particular, ESCOP 1997, and Koch & Lawson, 1996*)

These have a bearing on its therapeutic application.

1. Antibiotic activity
2. Antiviral, anti fungal, antibacterial, anti-protzoal, and anti-parasitic.
3. Inhibits the growth of gram negative and gram positive bacteria
4. Beneficial in cases of hyperlipidemia, hypercholesterolemia, and atherosclerotic lesions.
5. Improves blood fluidity, and reduces platelet aggregation.
6. Anti-carcinogenic, anti-tumour, and anti-mutagenic and has a prophylactic effect against certain types of cancer.
7. Effective in AIDS, arthritis, diabetes influenza, leprosy and TB.

In addition to the above, garlic is well endowed in trace quantities of vitamins, amino-acids, minerals, fatty acids, virtually all of which are necessary for good health. Many of the



so-called nutraceuticals, contain garlic as an ingredient. In recent research conducted at the National Cancer Institute in Bethesda, Maryland, it has been established that the regular consumption of garlic has been associated with a marked decrease in the incidence of diseases such as breast cancer, cancers of the colon, the larynx, the prostate, and stomach.

In countries where garlic is used either as a spice with food or as an item of food itself the incidence of such diseases is lower than the average, and these countries and areas include southern France, Italy, Sicily, Cyprus, and of course the Asian and South-east Asian regions.

Studies on the effect of garlic and its supplement preparations have been fewer, particularly in respect of human trials. However there is clear evidence in one study, conducted by Brosche and Platt (1994), that garlic supplements have significantly increased the phagocytosing granulocytes, in the serum of geriatrics.

Because garlic comes in many forms nowadays as supplements, researches are not agreed on issues as regards how best to deliver the benefits of garlic. But all agree on one thing, and that is that potential benefits can be derived from all the available forms.

The recent controversial results in respect of the effects of garlic in lowering human blood cholesterol and other serum lipids, have been attributed to the use in these researches, of preparations in which the allicin content has been diminished, in comparison to fresh garlic, by the processing conditions. [Stevenson *et al* (2000)]. But researchers such as Lawson of PBRI, Orem, Utah, Yu-Yan Yeh, of Pennsylvania State University, and Benjamin Lau, of the School of Medicine, Loma Linda University, California, who have been engaged in considerable research on the effects of garlic have no qualms about its merit.

#### 4. CONCLUDING OBSERVATIONS

The culinary value of Garlic, has now become a part of the world's cultural history. It is a part of the cuisine of almost every area of the globe. Significantly, some features of health and wellness have come to be associated, with some of the regions in which its use is traditionally intense.

Five thousand years or more of positive human experience is indeed an endorsement of garlic as a dietary ingredient with health benefits. Its use, in such established and unbroken sequential systems of traditional medicine such as Ayurveda, Unani, and Chinese medicine,

gives its value a stable confirmation. Now numerous laboratory, epidemiological, and clinical, studies have endorsed its value in bestowing health benefits to humans, and attempted to interpret these benefits in classified modern terminology and concepts. What the experts who have researched on garlic in recent times are agreed upon further is that more research is needed to shed light on how best we can make use of garlic in health., and in particular to unravel the mechanisms associated with its action. These, are still unclear for the most part, and calls for more research.

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There ain't much fun in medicine but there is much medicine in fun.

Josh Billings



# EXPLORING THE ANCIENT REALMS OF AYURVEDA

VIKRAMA

"The science of life shall never attain finality. Therefore humility and relentless industry should characterize one's every endeavor and approach to knowledge.

The entire world consists of teachers for the wise and enemies for the fools. Accordingly, knowledge conducive to health, longevity, fame and excellence, coming even from an unfamiliar source should be received, assimilated, and utilized with earnestness.

Charaka Samhita, Vimana Sthana, 8(14).

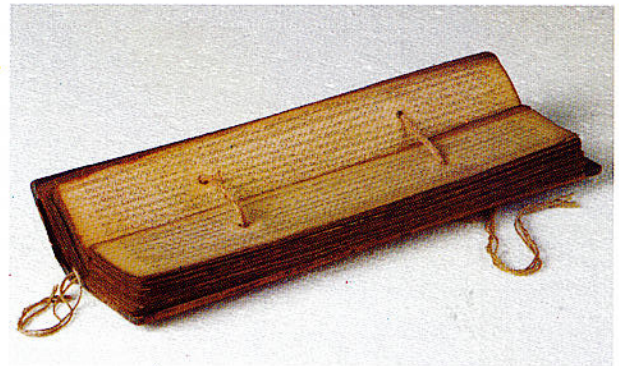
## INTRODUCTION

Ayurveda, as we know it, is the ancient system of medicine that prevailed throughout the Indian sub-continent for millennia. In time it permeated throughout the south and southeast-Asian region. In many countries of the region, it incorporated ideas from indigenous systems that prevailed therein, but substantially remains as the core system today. This is the case in Sri Lanka too. The term Ayurveda itself is rendered from the Sanskrit to mean "Knowledge" (*veda*), or the science concerning the maintenance of Life (*ayus*). The knowledge base was developed by generations of *Rishis* or philosophers, through centuries of observations, experiments, discussions, and meditations. The teachings of the *rishis* were passed on to generations of pupils orally for several centuries. It was only around 4500-1600 BC, that detailed and illustrated texts, commenced to be written in Sanskrit. The earliest ones are referred to as the "Vedas", or the four treatises of knowledge. These are the:-

- Rigveda
- Yjurveda
- Atharvaveda
- Samaveda

The knowledge within these treatises, came to be compiled into three major texts of Ayurveda, *Vridhaya Traya*, referred to as the Major Triad, namely the *Charaka Samhita*, the *Susrutha Samhita* and the *Ashtang Hridaya Samhita*. These will be discussed further in a later section.

So for a long period of time, Ayurveda survived and its merit was also propagated by oral tradition. Ayurveda itself and the *Siddha* medical system, originated in India, while, the *Unani* system of medicine originated in what was Persia, and came to India in stages with the various events of history. Modern Indian Traditional medicine combines the merits of these three systems, while the dominant influence is that of Ayurveda. No more is this true than in our own Sri Lanka, where what is in fact recognized as "Ayurveda" combines the influences of all of these three as well as the truly indigenous system known as *Deshiya Chikitsa*. Yet the dominant influence is that of the vast Ayurvedic system.



Palm-leaf manuscripts of ayurveda recipes were composed and handed down over centuries

## CONCEPTS AND PHILOSOPHIES

The intrinsic concepts of Ayurveda are based on the belief that it is a system of management of health as well as a manner of living itself. In Ayurveda, health is defined as the state where the physical body corpus, the senses, and the psyche, are in a state of natural balance. The vedic "sciences" from which Ayurveda is derived, attributes "life" to five basic (therefore indivisible) natural "elements" - referred to as the *Pancha Mahabhutha*. These are :- Earth, Water, Fire, Air and Space. It was considered that these were the main basic elements that also embodied the entire universe or macrocosm, and that the human body was a microcosm in a similar vein. In order to explain the mechanism of the human body, Ayurvedic theory postulates three main, causative forces, called *Tridosha*. These three



causative forces, or *dosas* are designated as: *Vata*, *Pitta*, and *Kapha*.

According to this theory, the three *dosas* are in a constant interaction within the human body along with what are termed the *Dhatu*s (the tissues) and *Mala*, which represents the metabolic end products of these tissues. Seven types of *Dhatu*s or tissues are described and arranged in hierarchical fashion. *Rasa Dhatu*, which is likened to plasma ranks first; it is followed by *rakta* or blood, *mamsa* or muscle, *meda* or fatty tissue, *majja* or neural tissue, *asthi* or osseous tissue, *shukra* or germinal tissue. *Rasa dhatu* is the primordial tissue and is formed by assimilation of dietary intake. *Rasa Dhatu* serves the other tissues with necessary nutrients. Thus the quality of *rasa dhatu* is influential in the functioning of all the other tissues.

In current interpretations of the original significance, the *dosa*, *Kapha*, is representative of solid material substrates, *Pitta* relates to the biochemical reactions within the body, and *Vata* is representative of the bio-energy within the body system.

The concept of health is based on the tripod of : the *dosas*, also referred to as humours in modern terminology, the *dhatu*s, (tissues), and the *mala*, (metabolic end products of these tissues), which make up the interactive elements. These components when in perfect equilibrium define the state of good health.

The *dosas* are in a predetermined proportion, from conception, and are in harmonious complementary function with each other, in the healthy state, in order to optimize the overall functioning of the body organism.

This balance in the functioning of the *dosas* is a necessary prerequisite to the maintenance of a healthy system.

*Vata*, literally means air, and concerns almost every vital part of the body system. It even has a major bearing on *Pitta*, and *Kapha*. *Vata* controls the respiratory, blood, lymphatic, excretory, and reproductive systems, as well as all types of movements. It is also responsible for the cognitive and neo-cognitive function of the brain, and secretion of various agents such as hormones.

Besides these somatic forces that are the *dosas*, the body system according to Ayurveda is composed of three psychological causative forces known as: *Satogun*, *Rajogun*, and *Tamogun*.

The somatic and psychic forces are also in harmony with the *dhatu*s, and the *mala*, when the body is in the state of perfect health.

A close interdependence as well as a bal-

ance exists between these components, within a normal body system. Any imbalance is deemed a factor for the causation of disease.

The major controlling sites of the *dosa* *Pitta*, are believed to be the stomach, duodenum, liver, spleen, pancreas, heart, eyes and skin, although like the *dosa vata*, it too is present in all cells.

The third *dosa*, *Kapha* is described as being responsible for the normal body fluids. Like the other *dosas* it too is present in every cell and its major sites are the chest, stomach, brain, tongue, synovial membrane and bone joints.

Then there is the concept of "Agni", frequently rendered as "fire" by those interpreting the concepts of Ayurveda in English. The justification for the use of the word fire in this context is the fact that just as burning of carbon containing materials causes the evolution of carbon dioxide gas, so does the metabolism of carbon based materials in the human body. Accordingly, bio-processes such as digestion, and assimilation of the digestives, is referred to in Ayurveda as *Pukwagni* or Digestive-fire. The enzyme action within the body that transforms the nutrients into the various tissue materials is called, *Dhatwagni* or tissue-fire.

It is understood that food must not only be digested and absorbed from the intestine and circulate in the blood plasma, but there must also be absorption into the tissue cells, in order to be assimilated by the body. Authorities believe that the Ayurvedic concepts in this regard are consistent with modern ideas of inter-cellular uptake, and the release of substrates and metabolites.

The theories of Ayurveda are extensive and elaborate and even some practitioners are barely conversant with them. (Mishee L.C. et. al. 2001 & 2004) There is an impressive array of philosophies and concepts, some of which are only beginning to be researched or understood by modern science. These include concepts such as incorporated in, *Prakruti*, or constitution of the human body, *Mano Guna*, or Mental Health Care, *Diyavyaguna vignana*, drug action, *Krya sharina*, equivalent to physiology, *Vikrithi vignana*, equivalent to pathology, and predominantly, that of *Rasayana*. (Udupa et.al., 1993)

Modern scientific medicine may have by-passed these intuitive Ayurvedic concepts due to the sophistication of scientific analysis, investigation and research, but some of them need understanding to enable the holistic approach, a significant aspect of Ayurveda, to be installed and engaged in modern health care.



In recent times the concept of *Rasayana* therapy has received special attention by the school led by the late Dahanukar, and Thatte. The claims for this type of therapy are far reaching. According to *Charaka* (*Vide* below), "one obtains longevity, regains youth, gets a sharp memory, and intellect as well as freedom from disease, a lustrous complexion, and the strength of a horse". Drugs that will improve the quality of the *rasa dhatu*, and thereby all the others, are termed *Rasayana*.

*Rasayanas* help to promote and maintain the *rasa dhatu*, as well as the other regulators of health like the *doshas* and *mala*, and thereby the total health of the body's systems.

They are sometimes referred to as "drugs that promote vigour in the healthy" and also as drugs that promote rejuvenation or retard the ageing process. One explanation may be that they help to build up non-specific resistance to infections. The Ayurveda concept of immunity, *vyadhy kshamatva*, is more than worthy of mention. In Ayurveda this is particularly important as the drugs that enhance immunity are classified as separate to the curative ones. The *rasayanas* are those that serve this function. This concept is similar to the European traditional "umstimmungs therapie". It is a concept that prevails in other systems such as the Chinese system, but has only recently entered western medicine in the form of "adaptogens" and anti-stress tonics.

The study of these intricate concepts would indeed help in the treatment of diseases related to immune deficiency, which are still little understood.

A most significant concept is that of *Prakruthi*. This concept is one that defines the uniqueness of every individual. It is assumed to be determined at the point of conception of the individual and refers to the intrinsic and innermost nature of the individual. It is the unique blend of qualities that makes each one of us from the point of conception, completely unique.

This concept forestalls the modern concept of the human genome. The *Prakruti* determines the general physical, psychological, characteristics of the individual and the proneness to disease.

One's basic constitution is fixed throughout one's existence which means that the combination of *Vata*, *Pitta*, and *Kapha*, that was present at the time of conception is maintained throughout the total lifetime. The concept of *Vikruti*, is conceptually allied to *Prakruti*. The latter is the person's basic fundamental state as from

conception. The former is the state of a person at any given point of time. Although one's state changes with respect to time, situation and other influences it should match the *prakruthi* or basic state as closely as possible. Otherwise if the current proportion of the *doshas*, comes to differ from the original *Prakruti*, it spells an imbalance and therefore illness. The divergence of the *Vikruti* from the *Prakruthi* therefore determines the extent and degree of illness.

Physicians will have to assess the extent of the divergence between the two, that is, the extent of imbalance of the *doshas*, by the use of the standard diagnostic tools, prior to administering treatment to stabilize the situation.

## AYURVEDIC TEXTS

The *Atharva-Veda* is regarded as one of the earliest *Veda's* or systematic texts, on which the knowledge of Ayurveda is sequentially described, as is known today. It was written around 1500 BC. The *Athar-veda*, includes religious and ritualistic practices as well, such as *manthra*, *niyana* (penance), sacred observations, fasting, and similar rites. It also contained, knowledge on herbal therapy, anatomy, and the classification of disease.

The best-known texts, that survived the vicissitudes of several wars, upheavals, and arson, that the sub-continent has known throughout its turbulent history, are now being resurrected and deeply valued. They are the *samhitas* or treatises, authored by the great *Acharyas*, or teachers namely, *Charaka*, *Susruta*, and *Vagbhata*. Of these the treatises of *Charaka* and *Susrutha* are considered the most authoritative classical Ayurvedic texts.

A well recognized authority Dr. R.D. Lele, a specialist in nuclear medicine, has in a volume entitled *Ayurveda and Western Medicine* stated:

*"Without detracting a bit from the tributes rightly paid by medical historians to Hippocrates, it can be affirmed that Charaka and Susrutha deserve the same primacy and place of honour as Hippocrates.. They deserve the same pre-eminence as the founders of Medicine."*

### *Charaka Samhitha*

The *Charaka* Treatise is attributed to the great *Acharya Charaka*, and is a dominant one in Ayurveda. According to *Charaka*, Ayurveda has eight branches :-



1. Internal medicine & Therapeutics (*Khaya chikitsa*)
2. Diseases of the specific organs, (*Shalakyā*) - (Ear, Nose, Throat, Eyes, etc.)
3. Surgery (*Shalya paharthrika*)
4. Toxicology (*visha garavairodhika prasamana*)
5. Psychiatry (*bhuta vidya*)
6. Paediatrics (*Kaumara bhrtiya*)
7. Rejuvenation (*Rasayana*)
8. Virilification (*Vajikarana*)

The *Charaka* Treatise is in four volumes and with eight sections or *sthanas* to elaborate on these branches.

1. *Sutra-sthana* contains, within 30 chapters, the general principles and the philosophy, including some of the basic ideas of healthcare, hygiene, preventive-care, diet and lifestyle. It also discusses, in addition to the medication the actors in a successful health-care system, namely the physician, the patient, and the caretaker.
2. *Nidhana-Sthana*, contains 8 chapters, in which are discussed, the causes of disease. It deals with the treatment of disease categorized as: Fevers, hemorrhaging, tumours, ulcers, diseases of the kidneys and the urinary system, ailments of the skin, mental conditions, as well as general debility of the system.
3. *Virmana- Sthana*, the third section, deals with more basic aspects such as the biochemistry, anatomy, pathology and physiology of the body system. It also deals with circulatory diseases, diseases connected with the digestion, nutrition, ingestion of food, and elimination, as well as diseases caused by parasites and infections.

**(It is significant that in this part is discussed the logical methodology of diagnosis, involving the sequence of observation, inference, interrogation etc, similar to the modern scientific method. Methodology for teaching of students is also discussed within this part. The general factors such as ageing, stress factors, natural and untimely ill health also finds inclusion here.)**

4. *Sharira-Sthana*, also consists of 8 chapters and deals with the body, the anatomical,

embryological, as well as some physiological aspects.

5. *Indriya sthana*, the next section with 12 chapters deals with the diagnostic aspects as well as the prognosis of the various types of disease.
6. *Chikitsa Sthana*, has 30 chapters and these deal with the therapeutic aspects.
7. *Kalpa Sthana* with 12 chapters deals with the pharmaceutical aspects.
8. *Sidhi Sthana*. deals with the curative side of disease, within its 12 chapters.

The *Samhita* as at present contains 150 chapters, and this is inclusive of revisions that have been made from time to time.

Dr. Nithya Anand a well known authority and a former Director of India's prestigious Central Drug Research Institute, at Lucknow, has recently (1989), interpreted *Charaka's* classification of diseases in modern terminology as follows:

*CHARAKA'S CLASSIFICATION OF DISEASE EXPRESSED IN MODERN TERMINOLOGY. (Nitya Anand)*

1. Infectious and Parasitic diseases.
2. Neoplasma
3. Endocrine, metabolic, immunological, & nutritional disorders
4. Diseases of blood and blood forming organs.
5. Mental disorders.
6. Disorders of the nervous system
7. Diseases of the circulatory system.
8. Respiratory disorders.
9. Digestive system disorders
10. Diseases of the genitor-urinary system.
11. Complications of pregnancy and childbirth.
12. Skin related ailments
13. Diseases of the musculo-skeletal system and connected tissues
14. Congenital anomalies
15. Perinatal diseases
16. Ill-defined conditions.

#### *The Susrutha Samhitha*

The *Susrutha Samhita* or the Treatise of the great scholar *Susrutha*, who lived about 3000 years ago, is on similar lines but it is significant that



this treatise focuses more on the surgical aspects. *Susrutha's* classification of disease corresponds to sections 1,2,4,6, and 7 of the *Charaka* classification, with a miscellaneous section.

The *Susrutha* Treatise describes *inter alia* the following :-

- Types of Inflammatory disease
- The various stages of Inflammation
- Accidental injuries
- Burns
- Fractures

*Susrutha* also describes the major surgical interventions such as the following:

- Intestinal obstruction
- Stones in the bladder
- Rhinoplasty
- Crushing and extracting a foetus
- Delivering a foetus by abdominal surgery
- Limb amputation
- Removal of foreign bodies.

*Susrutha* considered surgery (Shalya) as a high value therapeutic technique, as it enabled almost instantaneous curative intervention by means of instruments and appliances. He describes over a hundred kinds of instruments some (101) blunt instruments, and 21 kinds of sharp instruments, and accessories. Furthermore *Susrutha* describes 32 surgical operations. The instruments described include scalpels, forceps, pincers, trocars speculums, syringes, canulae, dilators and bone levers. The accessories include, thread, caustic coated thread (kshasutra), for non-surgical treatment of anal fistulas, twine for ligature and 14 types of splints, bandages and gauze.

*Anand, concludes: " from the vivid descriptions of surgical situations, operations, and instruments, surgery as a branch of Ayurveda seems to have been highly developed."*

*Anand further surmises: "In the current practice of Ayurveda surgery is very rarely performed. It is not clear as to what time the practice of surgery declined. During the Buddhist Period, as a consequence of the philosophy which discouraged vivisection, surgery was less favoured, and it is very likely that this fact coupled with the complications which can arise with surgery due to the non-availability of anaesthetics, and aseptic conditions, might have led to the decline of surgical practice."*

२३८

सूत्रस्थाने ।

शलाकायस्त्रम् ।

ताम्बूरी शलाका हिमुखा सुखे कुररकाकृतिः ।  
वेतनाङ्गी तथा विधेत् कफदोषसमुद्भवाम् ॥



सुद्रिका ।

अग्निशय्यपर्वप्रमाणा फलेऽर्धाङ्गुलायता सुद्रिका ।



वङ्गिशः ।

अक्षये शण्डिकामादेर्वङ्गिशः सुनताननः ।



करपत्रम् ।

भेदेऽस्यां करपत्रन्तु खुरधारं दशाङ्गुलम् ।  
विस्तारे द्वाङ्गुलं सूक्ष्मदन्तं सत्सरवन्धनम् ॥



कर्त्तरी ।

स्नायुस्त्रिगर्भशल्यानां केशादीनाञ्च कर्त्तने ।  
विविधाकृतयो योष्याः कर्त्तव्यः कर्त्तरीनिभाः ॥



A Specimen page illustrating surgical instruments described by *Susrutha* given by an early Ayurvedic treatise in Sanskrit

### Other Ayurvedic Texts.

All Ayurvedic texts written after the classic ones of *Charaka* and *Susrutha* derived their philosophies and methodologies from them. As a result they were improvements in one way or the other mostly in the manner that they incorporated knowledge that was acquired after *Charaka* and *Susrutha*.

Some of the more important ones are the following:

- *Asthanga Hridaya Samhita* (Based on the work of a medical scholar Vagbatta 500 AD), who was taught medicine by his father, and a Buddhist monk named *Avalokita*. This is a relatively modern (7120 AD) and distinctly more precise rendering of the concepts of Ayurveda. It incorporates the concepts and practices of the two major



samhitas together with much further information. Together with *Charaka Samhita*, and *Susrutha Samhita* it forms the powerful triad of Ayurvedic texts. It is a monumental work, in verse, and contains over seven hundred verses in six sections and 120 chapters.

This text is also one of the three major triads. The subsequent texts known as "triads minor" or *Laghu Traya*, consist of the following:

- *Madhavi Nidhana* written in the 12th Century deals especially with the diagnosis of disease according to Ayurvedic principles.
- *Sarangdhara Samhitha*, is noted for its systematized materia medica. It is also an extensive work, in three parts and 32 chapters.
- *Bhava Prakash* is in verse and was written around the mid sixteenth century AD. It deals primarily with treatment of disease. One of its features include 70 pharmacy lexicons (*Nighanthu Granthas*), which have been included periodically from 7th to the 16th centuries. These provide extensive information about the plant species used in the formulation of the medicines.

A modern treatise is the *Dravyaguna Vijnanaya*. It comprehensively describes over 500 of the most commonly used Ayurvedic herbal medicines, and includes for each plant species the following characteristics:

- Botanical name.
- Common or regional names.
- Description of the Plants, and parts used.
- Flowering and fruiting times.
- Habitat and distribution.
- Chemical constituents.
- Pharmaco-dynamics.
- Properties and bio-action.
- Therapeutic use with dosages.

This treatise is authored by Dr. Gayanendra Pandey, and has been compiled with the guidance of the Central Council of Indian Medicine, CCIM. (Publication date 2001)

In summary therefore and in current terminology, all these texts contained :-

- Concepts of disease and health.

- Management of disease.
- Anatomy & Physiology.
- Hygiene.
- Materia medica
- Pharmacology, & Pharmacy
- Therapeutics
- Methods of preparation of herbal-mineral formulations.
- Botany, Pharmacognosy & Taxonomy
- Toxicology.
- Chemistry and composition

In them diseases are classified according to the organ systems and their respective functions as envisaged in Ayurvedic theory. Special sections are allocated subjects such as :-

- Internal Medicine
- Surgery
- Obstetrics & Gynaecology
- ENT diseases
- Pediatrics and geriatrics
- Psychology & Psychiatric treatment

Besides these, categories of medicinal plants are described on the basis of their biological effects such as :-

- Anti-inflammatory,
- Analgesic,
- Anti allergic,
- Anti-histaminic,
- Diuretic and anti-diuretic,
- Emetic and anti-emetic,
- Purgative,
- Astringent,
- Anti- asthmatic,
- Anti-pyretic and so forth....

Over 70% of the drugs used in Ayurveda are of vegetable origin.

The methodologies for plant cultivation and harvesting for medicinal needs, the plant part used, are also described in these texts, and a thorough knowledge of taxonomy and systematic botany is revealed here. There are details of the method of harvesting and storage of raw materials and precautionary measures. For instance in the acquisition of plant material, much importance is attached to the correct identity of the species and authentication, the habitat from which the plant was collected, the soil in which it had been grown, the season and even the time of collection, and the method of collection and storage. The texts contain detailed descriptions on all of these aspects.



Other sources of therapeutic materials include animal products, metals and minerals, and there are also combined in the arsenal of therapeutic agents. The physical forces of nature such as sunlight, heat, cold, wind and rain are also used in the methods of treatment recommended by *Susruta*.

## METHODOLOGY OF KNOWLEDGE ACQUISITION

Knowledge has been accumulated since antiquity on the basis of intuitive deduction based on physical observations. In this, Ayurvedic knowledge does not differ from other forms of traditional knowledge. However the Ayurvedic system boasts its own methodology that is clearly outlined in the major texts referred to above. Both *Charaka Samhita* and *Susrutha Samhita*, emphasise the Ayurvedic method of enquiry for the acquisition of knowledge which is based on the original concept of *pramana*, which is derived from the ancient schools of philosophy. *Pramana*, encompasses the sequence of correct cognition, or understanding of the truth, training and disciplining of the mind and the senses to perceive the truth, followed by analysis and evaluation. According to the concept of *pramana* the sources of valid knowledge are :-

- *Apt Upadesha* - which means authoritative testimony. Whose testimony is authoritative is defined. However even knowledge so gained should stand the test of experimentation experimental observation prior to acceptance.
- *Pratyaksha* - which is direct observation. Knowledge obtained via all the senses and in particular the visual senses.
- *Anumana* - Logical assumptions made on the basis of knowledge gained by observation, and followed by the processes of deduction, induction, and analogy. There are three types of this a priori, post priori, and common observation.
- *Yukthi* - which is knowledge gathered by objective intellectual reasoning.

The *samhitas* record that prior to final acceptance as truths the knowledge has to be subject to several experimental tests. (*Pariksha*).

Final conclusions emerging from this processes are deemed to be truths beyond any doubt. (*Sidantha*).

The entire scheme of events is not dissimilar to our modern "scientific method", and is certainly more rigorous than what was prevalent in euro-centric science during the parallel period in time.

## HEALTHCARE & PHARMACEUTICAL TECHNOLOGY.

The framework of Ayurvedic healthcare, pharmaceutical technology and therapeutics includes the role of several recognized professional actors. Charaka considered the roles of the physician, the pharmacist (drug provider), nursing personnel, and the patient, as the four pillars of this framework.

In the earliest times the physician himself or other personnel under his direct authority were responsible for the preparation of the medicines. The treatment was carried out in his home. Subsequently there is evidence of the emergence of pharmacies, and hospitals, from the period 500 BC onwards. The texts indicate the necessary pre-requisites for pharmacies and even hospitals.

Pharmaceutical technology was seemingly well developed and the texts contain clear descriptions of the equipment and processes to be used. The processes included:

- Expression by pressure
- Extraction, & percolation -hot and cold.
- Filtration, through cloth.
- Distillation.
- Concentration of miscella to obtain extracts.
- Particular methods that apply to the making of decoctions, infusions, syrups and pastes
- Maceration with liquid extracts (particularly with metals and minerals)
- Extractions with oils and ghee and decantation.
- Fermentation - in wooden or earthenware vats.
- Purification or sterilization of water - by heating, or dipping heated iron rods, or clay into it, exposure to sunlight, etc.
- Clarification of aqueous solutions by addition of salts, precious stones or selected plant material.
- Calcining and roasting
- Mixing with excipients
- Stirring in bulk.



There are also detailed methodologies for the de-toxification of plants and minerals when used in the preparation of the prescribed Ayurvedic pharmaceuticals. Ayurvedic practice attaches great importance to plants containing poisons, for these possess the bioactivity for treatment of special diseases and are utilized as such in specialized drugs. They are used to prepare regular drugs as well and as such toxicology was regarded as one of the eight specialities of Ayurveda. Poisons whether of plant, mineral or animal origin, though fraught with danger, were nevertheless employed. After recommended processing and purification, (*Shodana kriyas*), are very useful as medicaments. *Shodana kriya* employs methods such as: boiling, and/or macerating with milk, cow's urine, or suitable extracts of plants. The texts on material medica, give elaborate descriptions of the process of *Shodana kriya*, which indeed is a manifestation of the extreme concern of Ayurveda, for the safety of the drug preparations.

The use of minerals and metals too is common in Ayurveda. The metals commonly used include, gold, silver, copper, lead, mercury, arsenic, tin, iron and zinc. As noted before, processes for the preparation of medicaments based on these are reviewed in the texts such as *Rasartuakara*, by Nagarjuna written in 700 AD. These include calcining the metals with plant extracts in closed earthenware vessels at very high temperatures. The absence of any toxic manifestations associated with the metals even such as mercury and lead in the final product, reveals that the process has satisfactorily converted the metal into a form, perhaps by oxidation, reduction, chelation or other mechanism, that renders the product non-poisonous.

## DIAGNOSIS AND DISEASE MANAGEMENT.

Diagnosis of a disease in Ayurvedic practice should follow the following main stages.:

- The specific features to be assessed are regarded as the eight point examination, which comprises of the following:
- Inspection
- Palpation = Assessment of palpable symptoms.
- Interrogation.



An Ancient mural depicting traditional process technology

The eight point examination consists of assessment of the condition and state of the following:-

1. Pulse
2. Urine
3. Stools
4. Tongue
5. Eyes
6. Skin
7. Speech & voice
8. General appearance.

Further examinations are conducted to assess the patient's digestive system performance, personal habits, body features and resilience. Other factors reckoned with are the recent illnesses, examination of any symptoms and pathogenesis. Assessment of the pulse or *Nadi*, is a crucial element in diagnosis and is one where the skill, experience, and training of the physician is of paramount importance.

The four main components of the disease management framework, as mentioned heretofore, are the physician, the therapeutic agents, the patient, and the nursing personnel. Details of



the requirements in each of these, are specified in the Ayurvedic literature.

Disease management consists of the following four procedures:

- *Samsodana* - Cleansing.
- *Samsamana* - Palliation
- *Kaya kalpa* - Rejuvenation
- *Sathwa vajaya* - Psychotherapy

However all disease management commences in the Ayurvedic system with "cleansing" which includes the five procedures identified as "Panchakarma". The procedures are selectively performed in accordance with the requirement for each patient as judged by the physician. Panchakarma is a major therapeutic procedure in Ayurveda, and useful in all disease conditions. It aims to relieve the body of the toxic substances which are a hindrance to management of an ailment.

Palliation is described as consisting of the administration of compound preparation of herbs and minerals for diet and lifestyle interventions. Rejuvenation is to strengthen the body system to combat the ageing and wearing processes, and psychotherapy refers to the methodology used in keeping the mind pacified and in good spirits.

Panchakarma is described in great detail in modern interpretations of Ayurvedic healing such as by L.C. Mishra (reference 4)

## CONCLUDING OBSERVATIONS

The foregoing is only a modest attempt to derive an outline snapshot as it were of a vast vista of knowledge that is encompassed in the Ayurvedic philosophy and practice. It attempts to give a skeletal idea of the vastness of the subject which is unmatched in the euro-centric medical models. The literature vast as it is translated into English and internationally available, sometimes in digital format. There are several significant features that need to be underscored in the context of utilizing this vast storehouse of knowledge for the use in modern healthcare. The very first of these is research. Modern research into several aspects can do a mountain of good. The *rasayana* concept is one very important aspect. Modern researchers like the Dahanukar-Thatte school have already made significant contributions, to enhance and bring into modern reckoning the immune-fortification approach to curing disease. (Dahanukas & Thatte 1989) With diseases such as AIDS, and

many "virus" implicated maladies whose causes and cures are still darkly obscure, the immune-strengthening approach is one way out of the morass. The current research group in Munchen, Germany led by Wagner, has also commendably launched into this area.

To quote the Wagner group:

**"Several Immunological *in vivo* and *in vitro* studies have surprisingly revealed that the total effect of a combination of herbal drugs with immuno-stimulating potential can be greater than expected from the sum effects of the individual herbs (Wagner and Jurcic 1991 & 2002) & (Wagne *et.at.* 1999)**

**These observations are supported by a review by Williamson (2001) on synergy and other interactions in Phytomedicines in which such effects from therapeutic areas other than immunology, have been studied.**

There are several areas within the nexus of Ayurveda and the modern sciences, that research could benefit the human healthcare effort. In the area of therapeutic agents used in Ayurveda there is ample conclusive evidence that needs no reviewing here (Nithya Anand, 1985; Wijesekera, 1991; Farnsworth *et al.*,1985, Farnsworth, 1988).

The techniques of Ayurveda can be clinically researched, and there can be value both ways, that is, to improve Ayurvedic methodology using modern scientific and technological advances as well as to imbibe new methodologies to the Euro-centric model. The Ayurvedic concepts warrant interpretation in modern terms, just as the concept of *Rasayana* is now well accepted. The integration into the modern system will indeed enhance the healthcare efforts of the world, just as has been proved by the spectacular success of the Chinese anti-malarial artimisinine, and the simple Indian cure for anal fistula. Accordingly, there is scope for the emergence of new, inexpensive and novel approaches, therapeutic agents, and methods, in controlling disease. And there are the diseases for which so far no definite cures are possible, such as diabetes, types of cancer, leukemia, Alzheimer's disease, Parkinson syndrome, Rheumatoid arthritis, and the world's major killing diseases which still are unconquered.

The approach to understanding Ayurveda will indeed boost efforts to conserve the plant biodiversity particularly in the developing world where there is wanton destruction in the name of development.



This effort is a humble endeavor to scientifically explore the vastness of a traditional system that has served humanity for many millennia already. The combination of its wisdom and a conjoint effort with modern scientific concepts and methodologies is what the world needs such efforts are being mounted with Ayurveda and Chinese medicine as well Xiao PeiGen *et.al.* (1999) From a global standpoint this is most welcome. However in Sri Lanka we are yet, sadly, in the compartmentalized configuration.

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When you are healthy, your body, your mind, and your emotions are in balance.

**Dr. Lelord Korel**

Wherever the art of medicine is loved there also is love of humanity.

**Hippocrates**

### Humour in Medicine

The Art of medicine consists of keeping the patient amused while nature heals the disease.

*Voltaire*



## HERBS IN THE TREATMENT OF MENTAL DISORDERS

- Anissa

Herbal therapy may well provide an alternative to the treatment of psychiatric conditions. The American Psychiatric Association estimates that approximately 10-25% of women, and 5-12% of men suffer from depression at some point in their lives. Besides this, around 2.5 million people in the US alone are estimated to suffer from the condition now known as Bipolar Disorder.

Bipolar Disorder (BD), also referred to as Bipolar Syndrome or more commonly as Manic Depressive Illness, is one of the commonest mental disorders even in Sri Lanka, and in the National Hospital for Mental Health in Mulleriyawa, (Angoda), there are many sufferers many between the productive ages of 19 to 39. Typical symptoms of the disease, are unusual swings in a person's mood, energy level and ability to function. The consequences are dramatic. The sufferers find difficulty in attending to their jobs, and are often in the state where personal relationships are endangered. Most times, they have to be hospitalized, as home management of the patient and the disease is far from easy. There are suicidal tendencies, and alternating episodes of mania and depression, which have recognizably different sets of symptoms.

These are as follows:-

### Mania Symptoms

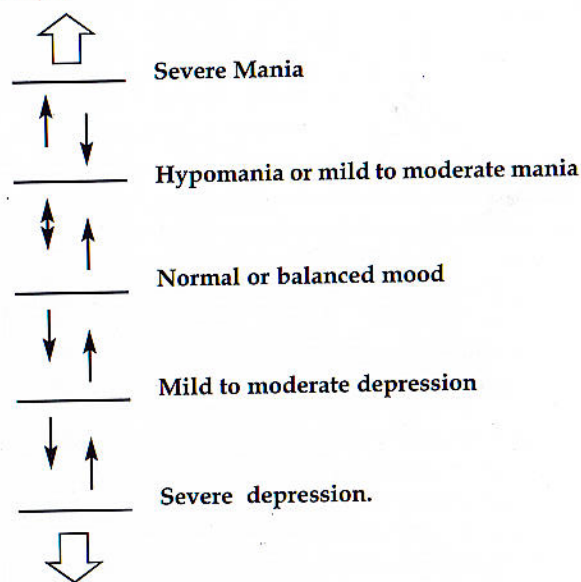
- Enhanced levels of Energy & Activity often Restlessness.
- Excessively euphoric and even often good moods.
- Extreme irritability interspersed with bad moods.
- Swift fast moving thoughts and speech.
- Poor concentration, easy distraction.
- Unrealistic beliefs in own ability and powers.
- Flawed judgment.
- Periods of spending large amounts of money.
- Enhanced sexual drive.
- Prone to abuse of drugs and alcohol
- Provocative, intrusive and aggressive behaviour.

- Lack of understanding that anything is wrong
- Reduced need for sleep.

### Depression Symptoms.

- Lasting sad or empty moods with anxiety.
- Feelings of pessimism and hopelessness.
- Feelings of guilt, hopelessness, and helplessness.
- Lack of interest in activities once indulged in and sometimes even sexual activity.
- Feelings of constant fatigue and depleted energy.
- Problems of memory recall, and concentration.
- Restlessness and irritability.
- Too much or too little sleep.
- Changes in Food Intake patterns
- Sudden Weight loss
- Chronic pains not related to any injury.
- Thoughts of death and suicidal tendencies

The mood swings that are characteristic of BD can be diagrammatically represented as follows:



Herbs are known to contain a great variety of chemical substances with a spectacular diversity in chemical structural types as well as bioactivity. Currently the resurgence of herbal medicine in the industrialized world is gaining further momentum. According to the Journal of the American Medical Association (JAMA), 1997, an estimated 40% of all Americans, employed alternative or complementary therapies which



involved in the most part the use of herbal drugs. The US Herbal market is growing considerably with consumer demand way ahead of the regulatory authorities.

There is a great deal as yet unknown about interaction between herbs, and synergism between some herbs has been noted. The emergent subject of what has been termed "Reverse Pharmacology" is an attempt to utilize the diversity of chemical entities and biological activities of herbs for the healthcare needs. No more is this vital than in the instances of mental disorders or failures which range from bipolar disorder to the dreaded Alzheimers Disease.

In the practice of Ayurvedic Traditional Medicine there is established treatment for mental disorders and many types of such disorders are recognized in the system. The discovery of the potent alkaloid Reserpene, as treatment for hypertension, from the Indian Plant *Rauwolfia serpentina* is one of the several historic instances where an Ayurvedic Drug, by scientific research came to be an integral part of modern allopathic medicine. Further, by synthetic studies on molecules related to the reserpene structure, more valuable drugs have been derived. Today there are many such examples, where western euro-centric medical treatment has acquired an extra dimension from Ayurvedic remedies, or Traditional Chinese medicine.

There are many herbs within the Ayurvedic Pharmacopoeia as well as elsewhere, which may serve to address the needs of sufferers of mental

ailments such as the common bipolar disorder. Some of the herbs that fall into the category that are candidates of research by reverse pharmacology will be briefly discussed, but first what are the characteristics of reverse pharmacology?

There are three recognized phases.

1. Critical. Documentation of the recorded clinical observations of the biodynamic effects of the standardized Ayurvedic herbs. (For this meticulous record-keeping would be needed such as for the following:
  - Studies on tolerability.
  - Drug interactions
  - Dose range optimization.
  - Para-clinical studies in relevant *in vitro* and *in vivo* models to evaluate the target activity
2. Experimental studies, basic as well as clinical, at several levels of biological organization, to identify and validate the reverse pharmacological correlate of Ayurvedic drug safety and efficacy.
3. The need for a creative team of multi-disciplinary specialists, to conduct the research.

The following is a sample list of proven herbs, used in Ayurvedic preparations, that may be initially researched on as candidates in the treatment of mental disorders:

	Common Name	Botanical Name	Uses
1.	Gotu Kola	<i>Centella asiatica</i>	Used orally for reduction of fatigue symptoms Anxiety and depression and for improvement of Mental activity (See LNP Digest vol 1(2), 8.)
2.	Garlic	<i>Allium sativum</i>	Used in a great many Ayurvedic preparations. (See LNP Digest 2007:3.no2)
3.	Lunuwila	<i>Bacopa moniera</i>	Used in Ayurveda as a memory enhancer
4.	Cannabis	<i>Cannabis indica</i>	Used as an antidepressant in Ayurveda
5.	Kava	<i>Piper methysticum</i>	Used in the far east and Oceanic islands for anxiety
6.	Ginko	<i>Ginka biloba</i>	A well established herbal remedy
7.	Valerian	<i>Valeriana officinalis</i>	Used as an antidepressant
8.	Ekaveriya	<i>Rauwolfia spp.</i>	The classical antidote for hypertension
9.	Abin	<i>Papaver somniferum</i>	Used as a sedative
10.	Araliya	<i>Aralia elata</i>	Used as an antidote for alcohol absorption
11.	Jatamansi	<i>Nardostachys jatamansi</i>	Used to counter anxiety symptoms
12.	Amukara	<i>Withania somnifera</i>	Used in age related cognitive deficits
13.	Yavani	<i>Hyoscimus niger</i>	Used in treatment of dementia
14.	Vada kaha	<i>Acorus calamus</i>	A component of Ayurvedic <i>rasayanas</i> .
15.	Jasmine	<i>Jasminum offinale</i>	Used in Asia as a sedative.



The above is only an indicative list of the plants that show some activity related to mind related syndromes. Ayurvedic texts should be consulted and the information analysed in the design of any clinical experiments to assess the efficacy in relation to a syndrome such as BD. That there is a dire need for a new approach towards the cure of BD is only too obvious. Ayurvedic medicines and the herbs used in the therapy merit serious consideration if the unnecessary human suffering is to be minimized.

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## POMEGRANATES ARE - IN

- Keara

The Pomegranate, or *Punica granatum* L, is a fruit with a history as long as that of mankind. It is said that the Pomegranate was the fruit of the Garden of Paradise.

Researchers at the University of Wisconsin, School of Medicine, say that their recent findings reveal that the juice of the pomegranate shows distinct promise to combat cancer of the prostate. In the United States prostate cancer is one of the most common invasive cancers, and is the second leading cause of deaths by cancer.

Research has already shown that pomegranates display anti-oxidant as well as anti-inflammatory activity. In fact it is reputed to possess higher anti-oxidant activity than do red wine and green tea.

Using human prostate cancer cells the University of Wisconsin team evaluated the efficacy of pomegranate juice. They found a dose-dependency, or quite simply put, the greater the concentration of extract the cells received, more cells perished. The research team tested the effect of the juice on mice with prostate cancers, the doses being chosen so as the parallel a rea-

sonable human intake. Dramatic effects were observed. There was significant slowing of the cancer progression and a decrease in the levels of prostate specific antigen. The leader of the Team at the University of Wisconsin exudes optimism. He believes the study indicates that pomegranate juice contains very powerful agents against cancer, particularly cancer of the prostate. There is good reason now to test this fruit in humans, both as a preventive, and as a cure, and this is the belief of Professor Hasan Mukthar, the team's leader.

The merits of pomegranate juice, seems to be known already to many in the United States. Work done at the David Geffen School of Medicine of the University of California at Los Angeles, has shown it to contain many constituents that are with health benefits to humans. There are, besides polyphenols such as punicalagin, compounds with anti-viral, anti-oxidant and anti-tumour properties.

In particular, Pomegranate juice has been tested for its capacity to protect nitric oxide against oxidative destruction and found to be a potent inhibitor of NO disappearance mediated by super-oxide anions. Thus the biological action of NO is protected and in this it is rated superior to grape juice, blue berry juice and red wine.

Work conducted at the University of Chicago at Illinois, has also revealed, that pomegranate juice displayed anti-cancer effects in human breast cancer cells *in vitro*.

So the ancient pomegranate fruit believed to have originated in what is presently Iran, and which has been now cultivated in several regions of the globe, is once again a distinguished special food supplement.



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## LOSING OUR BIODIVERSITY ?

- Ayesha

Scientists predict that between a third to two thirds of the world's biodiversity could be lost by the end of this century. This is due to the wanton destruction of our tropical forests and the natural habitats of wildlife and wild plant species. Wild species of birds, bats, and amphibians are believed, to add several billions of dollars each year to the world's agricultural economy by controlling pests, and pollinating our major crops. This is a free service they give and get little credit for providing it. More than a quarter of all medicinal preparations possess active ingredients derived from wild species. Or they are based on those derived from these wild species and modified after research and study. This represents billions of dollars in sales and reduced costs of health care. Further, when natural forests are indiscriminately cleared in the name of development, the hardened soils left behind allows pooled water to breed mosquitoes and other species without control. This accounts for a major increase in deaths as a result of diseases like Malaria.

Rich or poor, industrialized or underdeveloped, all the people of the world are inextricably linked with the world's biodiversity. The species sharing this planet, its oceans, rainforests, grasslands, and all habitats of diverse species become a part of the lives of all beings. It is time the global community recognized this.

It is gratifying to note that for the first time the leaders of the global community's most powerful members, have taken a definite initiative. At the G8 meeting in Germany this year they have endorsed the idea of an international study to examine the economic benefits of conserving the global biodiversity. It is a duty we owe to the future generations, and a legacy for the children of today.

Let us hope that collective action will arise from this initiative.

### Source :

Phillipe Costeau & Phillip E. Clapp. Earth Echo International, & National Environmental Trust in Washington DC. Project Syndicate 2007, The Sunday Times International, July 8th. 2007.

Life is short and the art long.

Hippocrates.

## PATENTING HERBAL DRUGS - A possible new drug for Dementia?

- Annissa

The patenting of herbal drugs has been a problem for both the producers in countries where the drug originated as a medicinal plant, and to the would-be agents interested in patenting. One of the main obstacles has been the fact that the information has been in the public domain for many years due to the use in traditional medicine. Some years ago the attempt to patent *Curcuma*, was successfully thwarted. To gain profits from what has been the treasures of traditional medicine, and thus available, free, to the greater part of humanity, seemed immoral and counterproductive from the viewpoint of global health care. On the other hand the costs and labours of research deserve rewards. This is a major dilemma!

Now, we have the news, that the Chinese have licensed their first herbal compound to the UK based company PHYTOPHARM.

The company plans to conduct global clinical trials on the compound, with the hope of developing a suitable drug to combat loss of memory and concentration. It is the hope that this will lead to a facile method of making such drugs available to those who are in need in the countries of the third world. Thus, traditional medicine could open a new door for the cure of diseases which have so far been incurable, for the benefit of mankind.

The patented compound in question, is the result of research conducted at the Beijing Institute of Radiation Medicine, BIRM, of the Chinese Academy of Military Medical Sciences, CAMMS, in Beijing. It is described as a steroidal saponin, derived from the Rhizome of *Anemarrhenae* spp. A drug used in the Chinese system of Traditional Medicine, under the Chinese name Zhimu

Ma Baiping, the leader of the research team at the BIRM, and his team have conducted a ten year research effort and found the compound to possess properties that increased the blood flow to the brain of experimental animal models, and reducing inflammation. In addition the compound stimulated nerve cell growth, and significantly improved memory in rats.

The group believe it to be a very promising candidate drug for human dementia.

This is the first time that China has licensed a herbal patent for an innovative drug to an international company according to Sun



Jianzhong, the President of CAMMS. He believes that this is an important step towards the modernization of Chinese Traditional Medicine.

Phytopharm is of the view that it is a worthwhile investment, and will open the door to the vast treasure trove of Chinese medicine. The CEO of Phytopharm, Darrel Rees thinks that although they forked out millions of pounds, the deal was worthwhile, and that it would not have been possible without the rising awareness of scientists in China of the benefits of patenting research findings in a mature intellectual property system.

The plant *Bacopa moniera*, (Sinhala: Lunuwila), for long used in Ayurveda for memory enhancement, has also been shown to be of similar value, by researchers in India, and two compounds, the triterpenoid saponins, Bacosides A and B are now marketed as therapeutic agents.

#### Sources:

Hengpeng Jia (2007) Chemistry World, 4(8), 16.  
Wijesinghe, T. (2006). LNP Digest, 2,(1),13.

### HERBAL DRUG TO STOP SMOKING AND ALCOHOLISM ?

- Ayesha

To those who are addicted to alcoholism or smoking this will be a dream drug, given the now proven dangers of either addiction. However the promising lead that has recently been reported is still in the very early stages of drug development. Anyway the promising lead like many of those now in the category, again comes from a natural product sources.

Varenicline, had been licensed in the UK in 2006 under the brand name of Champix. This was to be used as aid for the cessation of smoking. The active compound is based on the chem-



ical structure of cytosine, a natural product derived from the plant *Laburnum anagyroides*, which has been licensed as a smoking cessation treatment for over forty years.

Using a rat model of alcohol dependency, scientists at the Earnest Gallo Clinic Research Center at the University of California, San Francisco, have shown that the drug reduces rates of alcohol consumption and alcohol seeking behaviour patterns in the rat.

It is estimated that most (over 80%) of alcoholics are also smokers. But this is the first time that an agent acting on the nicotinic receptor system has been shown to have any impact on alcoholism as well. Varenicline was shown to cut alcohol intake by over 50% at the highest dose of 2mg/kg, which is the dose used in people to assist in the cessation of smoking.

Source : Steensland, P. *et al.*(2007). Proc. Natl. Acad.Sci. US, DOI:10.1073/pnas0705368104

### WILL PUMPKIN PROVIDE AN ANTI-DIABETIC DRUG?

- Keera

Recent Chinese research, on Natural Products, seem to have come up with yet another candidate drug to combat diabetes. A preliminary study reveals that the Asian Pumpkin, the one with the dark green rind and the pale yellow pulp inside, (Sinhala: Watakka) may help in thwarting type 1 Diabetes. The research is based on experiments carried out on rats and though strikingly indicative it is still to be established on human subjects. The valuable lead is the result of



investigations conducted at the East China Normal University in Shanghai, by Tao Xia and his collaborators. In normal subjects blood sugar levels are controlled naturally by the hormone



insulin, which is synthesized in the human body by the pancreas. In the type 1 Diabetes the immune system of the body mistakenly attacks the very pancreatic cells responsible for insulin. This interferes with the body's natural formation of insulin and hence the control of blood sugar levels. The Chinese team found that an aqueous extract of the pulp of the pumpkin when fed to rats with type 1 diabetes for a month, the high blood sugar level of these diabetic rats was significantly lowered when compared to a control group. Further healthy pancreatic cells capable of producing insulin were also in abundance in the group of rats fed with the extract of the pumpkin pulp. The researchers conclude that the extract of the pulp of pumpkin was capable of saving some of the pancreatic cells, or revive those damages as a result of the diabetes.

It may be too early to draw conclusions but this is a lead, and strengthens the belief in Ayurveda that the maintenance of a healthy condition is often tied up with a relevant diet.

The research has not yet identified the chemical entities that are responsible for the effect.

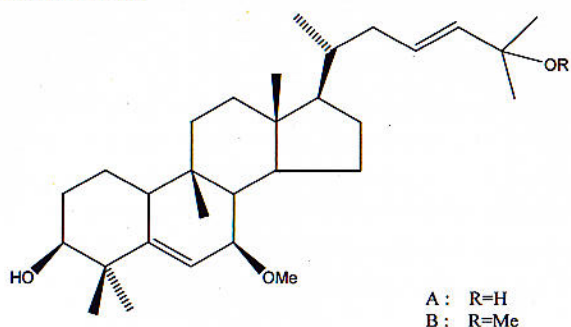
**Source:** J. Sci. Food Agric. (2007) 87,1753-1757. <http://diabetes.webmd.com/news/20070709/pumpkin-benefit-for-type-1-diabetes?>

## KARAWILA - POST SCRIPT.

[Sequel to LNP Digest Article on KARAWILA Issue 2007, 3(1)]

Some recent chemical research on Karawila (*Momordica charantia*) has been published by S. Nakamura *et. al* [Chem. Pharm. Bull. 54 (11) 1545-1550, (2006)]

They have extracted the dried fruits of Karavila obtained from Nuwara Eliya in Sri Lanka. They have isolated a number of compounds which include several Karavilagenins and Karavillosides. Candidates for the possible recorded anti-diabetic effect of Karavila seem to be the Karavilagenins A & B with a chemical structure as:



## VETIVER - VALUED AROMATIC PLANT WITH MEDICINAL ATTRIBUTES.

- Annisa

Vetiver belongs to the family of grasses (Graminae) and is botanically identified as *Vetiver zizanoides*. In Sri Lanka, Vetiver, (Sinhala = Savandera) has been cultivated in limited fashion even during colonial times. Its use as an aromatic plant is based on the strongly aromatic scent of the profuse roots the plant puts out. When steam-distilled the roots give rise to an essential oil which is very highly valued in the perfumery trade. Vetiver oil is produced commercially in China, India, Indonesia, Haiti & Reunion. Sri Lanka too produced limited quantities of this valuable oil in the 1970's but nowadays the trade in the oil has diminished considerably.

Vetiver oil is used in the perfumery industry in a variety of products, such as perfumes, deodorants, soaps, shampoos, and other personal care products. It is an irreplaceable constituent of such famous perfume brands like: Guerlain's Vetiver, Chanel's Coco, Christian Dior's Miss Dior, Yves Saint Laurent's Opium, and Givenchy's Ysatis.

In these and other perfumes Vetiver forms what is known as the "bottom note" - that is the lasting note. This is on account of the fact that Vetiver oil contains aromatic constituents, mostly, with a high molecular weight. These are what are chemically known as sesquiterpenes, chief among them being vetiverols and vetiverones. For the reason that these sesquiterpene constituents have high molecular weights, and low vapour pressures, extraction by steam distillation is a relatively prolonged process, requiring extended distillation times in comparison with other essential oils.

It is an interesting fact that vetiver is reputed to possess many valuable health-related attributes. It is credited with a sedating as well as a strengthening effect on the nervous system. This probably justifies its increasing utilization as an aromatherapy and massage therapy agent.

It also repels insects and is used in protecting books and documents. Its latest use is as means of combating pollution in lakes and rivers. Vetiver has been and remains a plant with multiple uses, and its propagation and utilization is being researched intensely particularly in the nations of the Pacific Rim.

**Sources:** Chomchalow N. (2000) Pacific Rim Vetiver Network. Technical Bulletin Nos. 2000/1 and 2001/2 and cited references.



# NEWS, EVENTS & OPPORTUNITIES

## STRENGTHENING OF H.E.J. RESEARCH INSTITUTE OF CHEMISTRY

### INTERNATIONAL CENTER FOR CHEMICAL AND BIOLOGICAL SCIENCES UNIVERSITY OF KARACHI

KARACHI-75270

#### ACADEMIC POSITIONS VACANT

Applications are invited for a Tenure Track position of Assistant Professor with attractive salary package. Applicants should have a Ph.D. degree in (Organic Synthesis, Natural Product Chemistry, Structural Organic Chemistry, Spectroscopy, Food Chemistry, Polymer Chemistry) with at least 1 year of post doctoral teaching or research experience, in a HEC recognized university. Applicant should have experience of working on total synthesis and development of synthetic methodologies. Pay Scales according to the approved HEC Statutes for Tenure Track will be applicable.

Applications should be submitted on prescribed form which can be obtained from the Administration Office (Establishment Section), Room No. 201, International Center for Chemical and Biological Sciences, against a pay order of Rs.300/- drawn in favor of the Director (Acting). H.E.J. Research Institute of Chemistry, International Center for Chemical and Biological Sciences.

Six copies of application together a pay order of Rs.700/- drawn in favor of the Director (Acting), along with attested copies of the degrees/certificates and reprints of research publications, must reach to the Director (Acting). H.E.J. Research Institute of Chemistry, International Center for Chemical and Biological Sciences, University of Karachi-75270 within six weeks of the publication of this advertisement.

DIRECTOR (Acting)

#### FACULTY POSITIONS

##### (ASSISTANT / ASSOCIATE / FULL PROFESSOR) (MOLECULAR MEDICINE / NEUROPHARMACOLOGY / MOLECULAR GENETICS)

Dr. Panjwani Center for Molecular Medicine and Drug Research, University of Karachi, Pakistan, announces faculty positions with an initial appointment of three years (extendable), involving research, teaching and supervision of post-graduate research. Open to candidates of any nationality. Ph.D. in the relevant fields along with proven track record of original research is required. Salary: upto US \$ 5000/month, along with on-campus accommodation, laboratory space and an annual leave of one month. Generous start-up grant and project-based financial support (upto US \$ 0.2 million)

**Contact:**

Prof. Dr. M. Iqbal Choudhary,  
Co-Director, Tel: (92-21) 4824824-25; Fax: (92-21) 4819018-19;  
Email: [pcmd@cyber.net.pk](mailto:pcmd@cyber.net.pk); Website: [www.iccs.edu](http://www.iccs.edu)



## CORRECTIONS AND APOLOGIES

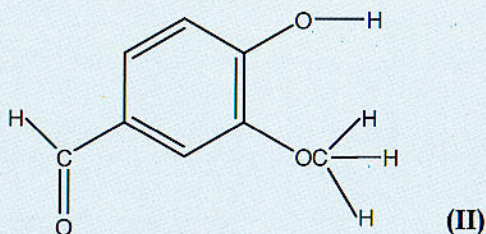
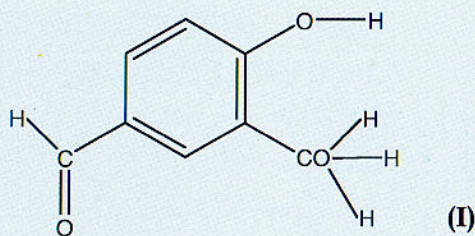
### 1. Attar-ur-Rahman is FRS

In LNP Digest (2006) Vol 2 (2) p. 32 it was inadvertently recorded that Professor Attar-ur-Rahman was made a Fellow of the Royal Society of Chemistry. He was made a Fellow of the Royal Society of the UK.

The error is regretted and our apologies to Prof. Rahman.

### 2. Structural formula of Vanillin

In LNP Digest (2007) Vol. 3 (1) Pg 18 the structural formula of Vanillin is erroneously represented as I. The correct representation is II.



## FIRST ANNOUNCEMENT WOCMAP IV

### 4TH WORLD CONGRESS ON MEDICINAL AND AROMATIC PLANTS-USING PLANTS TO BENEFIT PEOPLE

CAPE TOWN, SOUTH AFRICA, 9-14 NOVEMBER 2008

#### INTRODUCTION

In a meeting of the Secretariat of the International Union of Biological Sciences (IUBS) in Paris, nine international organizations decided to establish an international non-governmental body entitled: International Council for Medicinal and Aromatic Plants (ICMAP) [[www.icmap.org](http://www.icmap.org)] with the general objective of promoting international understanding and cooperation between national and international organizations on the role of medicinal and aromatic plants in science, medicine and industry, and to improve the exchange of information between them.

One of the functions of ICMAP is to arrange a world conference on medicinal and aromatic plants [WOCMAP] every five years. The first was in Europe [Maastricht, Netherlands 1992], the second in South America [Mendoza, Argentina 1997], and the third was held in Asia [Chiang Mai, Thailand, 2003]. Due to the geopolitical situation the participation was remarkably lower than at previous WOCMAP conferences, nevertheless more than 600 attendants were present. The proceedings of WOCMAP III were published in six volumes of *Acta Horticulturae* of the International Society for Horticultural Science.

ICMAP Bureau has invited the Leader of the Phytomedicine Programme at the University of Pretoria to organize WOCMAP IV in South Africa in 2008. We expect in the order of 1200 delegates for WOCMAP IV.

#### DETAILS

The organizing committee and sponsors warmly invite you to attend WOCMAP IV. The conference will be held at the Cape Town International Convention Centre (CTICC) in Cape Town from 9-14 November 2008. The CTICC opened in 2003 and is ideally located in the heart of the panoramic city of Cape Town and within walking distance of an abundance of superb accommodation and many tourist attractions, such as the world-renowned Victoria & Alfred Waterfront ([www.capetownconvention.com](http://www.capetownconvention.com))



## PROGRAMME

INTERNATIONAL SCIENTIFIC ADVISORY COMMITTEE AND  
PLENARY SPEAKERS TO BE ANNOUNCED SOON.

THEMES AND LOCAL ORGANIZING COMMITTEE /  
SCIENTIFIC COMMITTEE RESPONSIBLE FOR PROGRAMME.

Theme 1 : Biodiversity prospecting and ethnopharmacology.	Prof. Neil Crouch, South African National Biodiversity Institute, Durban.
Theme 2 : Conservation, cultivation and sustainable use.	Prof. Hannes van Staden, Leader Research Centre for Plant Growth and Development, University of KwaZulu-Natal.
Theme 3 : Perspectives in natural products chemistry.	Prof. Berhanu Abegaz, Chemistry, University of Botswana
Theme 4 : Targeted screening approaches for drugs and cosmetics.	Prof. Marion Meyer, Botany, University of Pretoria.
Theme 5 : Quality, efficacy and safety of phytomedicines and phytocosmetics.	Prof. Alvaro Viljoen . Pharmaceutical Sciences, Tshwane University of Technology, Pretoria
Theme 6 : Developments in industrial processing of MAPs.	Mr Ulrich Feiter, Managing Director Parceval, Wellington
Theme 7 : The economics and marketing of medicinal and aromatic plants.	Mr Myles Mander, Consultant, Durban
Theme 8 : New developments in laws and regulations for the use of MAPs. Trade and industry perspective.	Mr Thomas Brendler, Managing Director Plantaphile, Berlin
Theme 9 : Traditional medicine and health systems for new and old diseases.	Prof. Ben-Erik van Wyk, Botany, University of Johannesburg
Theme 10 : Nutraceuticals.	Prof. Ameenah Gurib Fakeem, Pro-Vice Chancellor, University of Mauritius
Theme 11 : Veterinary medicine:	Prof. Kobus Eloff, Leader Phytomedicine Programme, Paraclinical Sciences, University of Pretoria.
Theme 12 : Diverse aspects not accommodated in other themes.	Prof Anthony Afolayan, Botany, University of Fort Hare



## WHY YOU SHOULD CONSIDER ATTENDING.

- Leading scientists in the world in this area will be invited to present plenary lectures focussing on developments in different areas over the past five years and to discuss possible future developments and fruitful areas for research.
- All abstracts will be published in a special issue of South African Journal of Botany and will be listed in ISI databases.
- Many different aspects of medicinal and aromatic plants will be discussed with delegates from all continents. We expect in the order of 1200 delegates.
- There will be a MAP trade fair and special exhibitions running alongside the conference. These will include displays of African herbal products, ingredients and publications and stands of international companies and organizations offering technical and financial help to the MAP sector
- Sir Francis Drake called Cape Town "the fairest cape in the whole circumference of the earth" due to its natural beauty.
- Carl Linnaeus called it heaven on earth due to the astounding floral diversity. We plan to hold an early evening picnic at the world famous Kirstenbosch Botanical Garden on the slopes of Table Mountain.
- Cape Town has recently been voted as one of the prime tourist destinations in the world and previously as Best City in Africa and the Middle East, Favourite Foreign City, Best City to Eat Out and One of the World's Top 8 Creative Cities.
- The climate in November is excellent with temperatures ranging from 15-27°C and 11 hours of unshine per day.
- There will be a very interesting accompanying person's programme.
- There will be exciting pre and post congress excursions to different places in South Africa - a world in one country.

## DEADLINES

Abstract submission:	15 May 2008
Information on acceptance of abstract:	1 July 2008
Registration with payment to ensure inclusion of Abstracts in published Conference abstracts:	15 July 2008
Cancellation with full refund less bank charges:	15 July 2008
Cancellation with 75% refund less bank charges	15 Sept. 2008

## REGISTRATION COSTS

	Before 15 May 2008	Before 15 July 2008	After 15 July 16, 2008
Delegate from high income economy countries*	□360	□400	□460
Delegate from other countries	□288	□320	□380
Students (with proof of registration)	□234	□260	□320
Accompanying person	□81	□90	□1 10

\*See World bank definition at <http://web.worldbank.org>



## SOCIAL FUNCTIONS

Registration cost includes: welcoming reception probably in the Castle of Good Hope, evening picnic at Kirstenbosch Botanical Garden and Gala Dinner with traditional African dances and entertainment at a wine farm near Stellenbosch.

## SPONSORS

Phytomedicine Programme, Faculty of Veterinary Science, University of Pretoria;

[www.up.ac.za/phyto](http://www.up.ac.za/phyto)

ICMAP International Council for Medicinal and Aromatic Plants; <http://www.icmap.org/>

AAMPS; Association for African Medicinal Plant Standards; <http://www.aamps.org/>

To be updated

## COLLABORATING SOCIETIES AND ORGANIZATIONS

To be updated

## CONTACT

Please let us know by e-mail ([wocmap@up.ac.za](mailto:wocmap@up.ac.za)) if you are interested in receiving the second circular.

Kobus Eloff, Chairman Organizing Committee

## NOTE TO POTENTIAL CONTRIBUTORS

### Link Natural Products Digest

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

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

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

Authors may submit manuscripts by post or e.mail to :

**Dr. R.O.B. Wijesekera,**  
Editor-in-Chief

Link Natural Products Digest

e.mail : [robw@linknaturalproducts.com](mailto:robw@linknaturalproducts.com)

Post : **Dr. R.O.B. Wijesekera**  
Link Natural Products (Pvt) Ltd  
P.O. Box 02,  
Kapugoda

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

### All manuscripts must include the following :

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



# The Digest Mail Bag

## Letter 1

This is to let you know how very, VERY much I appreciate receiving volume 3(Issue 1) of the DIGEST ... I thoroughly enjoyed both 1 and 2, and dared not hope that it would progress so very well...So VERY interestingly...Thank you again... I have found each one even more interesting and instructive than its predecessor.

We always have boxes and boxes of the SAMAHAN available to give our guests(those from abroad appreciate it most!...much-even-more than 'tea') Now in Paspanguwa we shall have a fresh, new product in our shelf of medicinal beverages, but also another gift for our guests....Thank you all...It makes us so very proud to know that we have such Ayurvedic beverages ready and available ....And -as usual\the 'packaging' is excellent!

Ray Wijewardene, Colombo

## Letter 2

Dear Editors,

Thank you for the new issue of the Digest, I read it with interest and would like to make some comments.

The article IT'S QUALITY THAT MATTERS was very important and timely one and it strikes a familiar chord to me and should do so with all workers who make measurement in their professional capacity. ARE THE VAL UES (DATA) WE GENERATE REAL AND CORRECT? The only way to ascertain this is to run quality assurance controls along with you samples when taking the measurements. In treatment of the sick, clinical data is widely used in diagnosis prior to treatment. No wonder the FDA(Federal Drug Administration) and the ACCP( American College of Clinical Pathology) keep a vigilant eye on clinical labs. In most big cities even the city inspects the hospital labs. The only aspect you did not touch upon was the need for proficiency testing of laboratories once or twice each year and makes sure the unknown proficiency samples are measured within an accuracy and precision of +/- 15%. The PT samples are prepared and sent out by an independent source.

The article on VANILLA was very informative, I hope some entrepreneurs will take up cultivation of this fragrant and valued natural products. After 40 years as a chemist I could not miss the error in your structural formula of Vanillin: The O-methyl group should have the C atom with the 3H attached to it not the Oxygen. The O atom has to be attached to the phenyl ring carbon(Ph-O-CH3), you have it correct in the model.

I think in the poem by Masfield the reference to quinquireme of Nineveh is about a five decker ship which was rowed by slaves in the time of the Phoenicians 1000 years before the present era. If so globalization is at least 25-30 centuries earlier, do you agree? I am happy to note that the LNP-Digest has got an ISSN classification, keep up the good work!

Dr. A. Lakshman Jayewardene.  
Walnut Creek, California,USA.

## NOTE BY EDITORS:

*Thank you for the correction of the structural formula of Vanillin. It was a printing error when-O-CH3 was printed as -CO-H3.*

*This will be corrected.*

*Yes, we ought to have mentioned the need for proficiency testing of clinical laboratories. It is the business of the Ministry of Health and the National Accreditation Board. One wonders how practical that will be in a country such as Sri Lanka!*

*Yes. Globalization is not new. The buccaneering Age of Piracy was also a phase of it.*

## Letter 3

Dear Sir/Madam,

I visited your stall at the recent Ayurveda Fair at the Convention Centre and was given a copy of Volume 2 Issue 2006 of Link Natural Products Digest.

I must congratulate you on the quality of your Digest, and also of the articles therein.

I learnt several things, which I was unaware of.

Could you please send me any earlier Digests etc., that you may have, and also please include my name in your Mailing List.

Iqbal Jafferjee,  
898/A/2,

Pahalawela road, Talangama South.

## Letter 4

Many thanks for sending the copy of 'Link Natural Products Digest'. The topics that have been covered in the digest are of great interest. We at the H.E.J. Research Institute of Chemistry, University of Karachi would like to receive regular copies of the digest. Please tell me how could I subscribe it for the institute? I have received the Issue No.2 of the digest, kindly send me the first issue as well.

Prof. Dr. Muhammad Iqbal Choudhary  
H.E.J. Research Institute of Chemistry  
International Center for Chemical and  
Biological Sciences  
University of Karachi, Karachi-75270, PAKISTAN