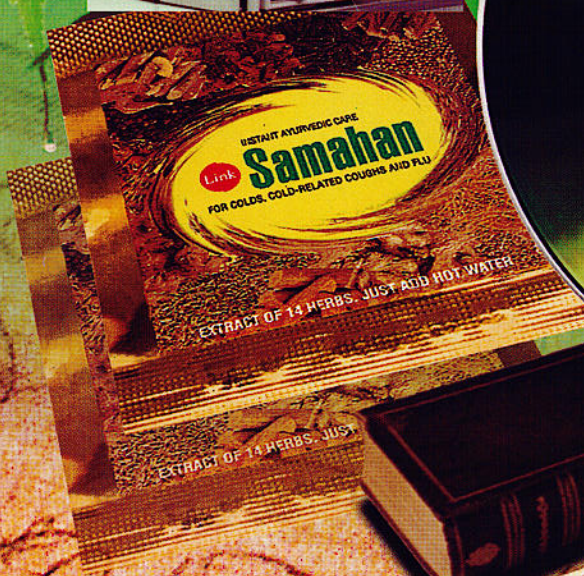
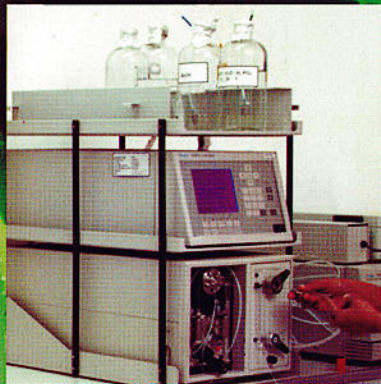


LINK *Natural Products* Digest

Vol.2, Issue 1, 2006



LINK NATURAL PRODUCTS (PVT) LTD

LINK Natural Products Digest

Volume 2, Issue 1, 2006

ISSN : 1391-8869

IN THE PAGES THAT FOLLOW.....



Registered Office
C. I. C. House,
199, Kew Road,
Colombo 02, Sri Lanka

Factory & Office
P. O. Box : 02,
Malinda,
Kapugoda, Sri Lanka

Tel : 94 11 2409294, 2339046
Fax : 94 11 2409293

e.mail :
info@linknaturalproducts.com

web site :
www.linknaturalproducts.com

Editor in Chief
R.O.B. Wijesekera

Editorial Consultant
M. B. Wijesekera

Editor
Asanki Yatigammana

Layout & Production
Sisira Wijetunga
Gamani Samarasekera

Printing
Samayawardana

Distribution
The Library & Information Centre
Link Natural Products

EDITORIAL	01
THE HERBAL PRODUCTS INDUSTRY	
Link Natural Products - <i>Philosophy and practice</i>	02
Plant based medicines - <i>The local scenario</i>	04
WHO Guidelines for the appropriate use of herbal medicines	07
KNOWLEDGE REVIEWS AND RESEARCH COMMUNICATION	
Nature's Wondrous Realm - <i>The Rainforest and its Canopy</i>	09
Of Onions and Tears	11
<i>Bacopa monniera</i> - a 'Smart Drug'?	13
<i>Anisomeles indica</i> - A little plant with big potential	14
Tracing the Development of a Herbal Product	16
Knowledge Round up - <i>Culled from Literature</i>	18
<i>Liquorice to preserve food</i>	
<i>'BANDAKKA' is therapeutic</i>	
<i>Neem to fight Filaria?</i>	
<i>Dangers of Antibiotics</i>	
THE DIGEST MAIL BAG	20
NOTE TO POTENTIAL CONTRIBUTORS	21

EDITORIAL

A CULTURE OF INNOVATION AND HEALTHCARE NEEDS

Success is almost always the result of several common factors. Defining clear objectives is foremost among them. Then comes the planned approach towards achieving the objectives. The team-effort required in planning and implementation is paramount. In the herbal products industry, more than perhaps in any other, the effort of planning and implementation requires a multi-disciplinary approach. This implies the application of good science and sound technology in design and innovation. In other words a company that has a science engine at the heart of its innovation, and the rigour of science derived technology, is able to deliver products of guaranteed quality and consistency. Given this, a company should also be guided by an entrepreneurial vision.

In the global setting of our industry, the focus is now placed on innovative therapies inspired by traditional methodologies - such as the great Ayurvedic System of Health Care. This system has stood the test of time. It has sustained the healthcare requirements of over a billion of the world's population for several millennia.

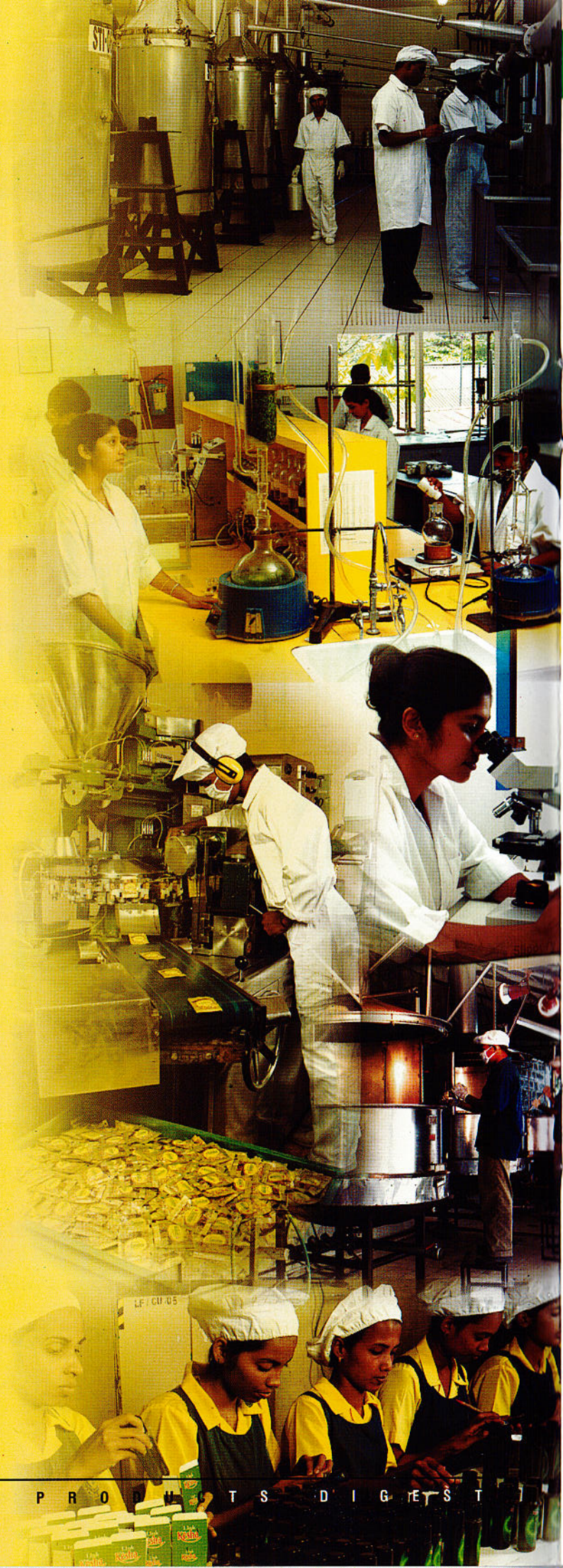
Much of the therapies used in modern medicine have been derived, through the judicious employment of science and technology, from plants used in Ayurveda. These are now well documented. Further, new bioactive molecular species derived from plants have inspired synthesis and enriched the synthetic armoury of modern medicine.

Yet modern medicine looks out today, desperately, for cures for such maladies as AIDS, Alzheimer's disease, leukemia, and to counter bacterial infections that are proving intractable in spite of modern antibiotics.

R&D in traditional medical therapies have been dominating the scientific work in Europe, the US, Japan, and even in India and China. In India and China the traditional systems are not permitted to languish in their primitive form. They are now becoming competitive in efficacy, safety and therefore popularity; and for the poorest sectors of the populations of the third world in particular, the answer to healthcare lies here.

In Sri Lanka too the momentum must be developed to give the benefits of science and technology to our ayurvedic cures. Education is needed to ensure that those who practice Ayurveda are aware of the benefits of scientific innovation. Those who practice western medicine must equally be educated on what scientific research has already, unequivocally shown, the value and wealth in Ayurveda. A new culture has to be evolved with innovation at the helm and human health care as the goal.

(See also Link Natural Products Digest, Inaugural issue : October 2004, p8 & p14)



LINK NATURAL PRODUCTS - PHILOSOPHY AND PRACTICE

R.O.B. Wijesekera

The latter half of the twentieth century has witnessed, *inter alia*, a dramatic re-emergence of herbal medicines the world over. There are numerous reasons adduced in explanation of this. Foremost among them, could be ranked a justifiable disillusionment with antibiotics and synthetic pharmaceuticals in respect of perceived harmful side effects, as well as a growing realization of the benevolent effects of some recently developed plant-derived medicaments.

Historically, plant-derived therapeutic agents held sway in the treatment of disease until modern times. The ancient systems of medicine such as were prevalent in the cultures of Arabia, China and the Indian sub-continent, largely utilized plant-based medicinal preparations to cure human ailments. The Ayurvedic system of Medicine dominated the health care in the Indian sub-continent. The Unani system derived from the ancient Greco-Arabian systems came into the continent as a result of Greek and Moghul influences. In the island of Sri Lanka a further influence was the Siddha system from southern India. Besides, the island itself had an indigenous system known as the *Deshiya* system. The system prevalent in the island today combines the influences of all of these systems, with Ayurveda as the dominant influence. As such what is collectively referred to as "Ayurveda" in Sri Lanka, differs if ever so slightly from the systems of the sub-continent.

Ayurveda has to its credit a rich treasure of classical literature. It developed over the centuries as a holistic system of medicine, which addresses the needs of human beings at three levels. *Viz*: firstly, prevention, secondly, awareness of the origin of life, and, thirdly, a systematic approach towards diagnosis and treatment of disease. Accordingly, Ayurveda is known as the "science of life"

Modern medicine has derived much benefit from both the concepts as well as the therapeutic agents used in the ayurvedic system. Several of the modern drugs had their origin in plants long used in Ayurveda. They are well documented in scientific reviews. Besides, concepts such as drugs which influence the immune system, entered the realm of modern medicine lately, no doubt based on established ayurvedic ideas.

Since Ayurveda is the science of life, it has within its scope methodologies for physical as well as mental health. Thus the judicious use of plant aromas and preparations made from aromatic plants as cosmetics, is also a significant part of ayurvedic practice. There is still an immeasurable wealth of treasures to be harnessed from Ayurveda as well as similar traditional systems, given the potency of modern science and technology.

Link Natural Products is a Sri Lankan Company, which came into existence in 1982, and was initially engaged in the production of natural essential oils from Sri Lanka's reputed spices and aromatic herbs. Once successfully established as a leading player in the essential oils industry, Link Natural Products were quick to see the potential of Ayurvedic pharmaceuticals and herbal health care products. At the time these were largely produced in the country by traditional methodologies with scant regard for good manufacturing practices or modern aspects of industrial quality management. It seemed logical therefore for Link to launch into this domain with the strength of its acquired experience and infra-structural advantages, and thereby to build a modern facility for producing a range of herbal products. Now, over two decades on, Link has achieved a position as the leading producer and distributor in the country of a wide range of plant-derived, health-related, products. These include the following:

- * Ayurvedic pharmaceuticals
- * Herbal health care products
- * Personal care products
- * Branded Ayurveda-based products
- * Aromatherapy products

During the years, Link has developed its own unique methodology of product development. It commences with a study of the traditional methods and practices associated with the different ranges of product. These and the associated knowledge of them are carefully scrutinized and evaluated by Link's panel of Experts in Ayurveda. The panel meets on a weekly basis, and also interacts with Link's scientific and technological personnel. Literature surveys on

each of the plant species to be used are systematically made and all information collated in a manner suitable for the decision making process. The kind of product to be developed and the target consumer is logically evaluated at the commencement of product development. The R&D division of Link is now a very modern outfit where qualified personnel are supported by expert consultants with considerable experience in internationally recognized institutions. The state-of-the-art-laboratories, and processing plants are housed in Link's modern sprawling campus set amidst lush green surroundings at Dompe, a hamlet about thirty kilometers east of the city of Colombo. Set in the campus itself is a live herbarium of selected medicinal plants, which forms a natural cyclorama to the buildings housing the factory and research complex.

The company philosophy can be summed up quite simply *viz: to utilize the inherent treasure trove of the knowledge of Ayurveda, combined with the versatility of modern Science and Technology, in order to produce and deliver herbal products for the health and well being of humanity.*

As a consequence the company recognizes that a policy of Total Quality and Environmental Management is a key determinant to sustainable development. The philosophy also encompasses faith in the traditional methodologies, which were indeed environment friendly. All raw material used in the production process are specially selected, or cultivated under supervision. Post harvest treatment, and process technology are in accordance with scientifically optimized process protocols developed by the company, and all these form part of the practice and culture of Link. The company believes in continuous product improvement

and the R&D division keeps a watchful eye on both process and products at all times.

In acknowledgement of Link's rigorous quality control practices it was awarded the ISO 9001:2000 certification in March 2001 for its quality management system, and the ISO 14001:2004, for the environment friendly methodologies it has adopted.

The Research Policy of Link is in accordance with its avowed philosophy. Research is conducted on the aspect of ayurvedic knowledge, and for a company of its size Link's library facilities, in the range of its product interest, is growing rapidly. The latest facilities of information technology such as, internet-access, are now an asset to its staff. A key element of its research thrust is the development of specific instrumental analytical methods for the quality assessment of products, raw materials as well as intermediates.

The formulation of new and improved products is another area where there has been considerable attention. Research staff, are periodically enabled to attend both international and local professional seminars and meetings with the purpose of updating knowledge and expertise. It is also the policy to obtain the services of high-level consultants, and current university staff to train the R&D staff of the company.

Besides, the company sponsors research at Universities, and also events of professional organizations, such as the Institute of Chemistry and the Sri Lanka Association for the Advancement of Science.

The Link range of products carry with them the guarantee of quality, based on its rigorous methodology, which combines the dictates of the traditional methods with modern science and technology.



PLANT BASED MEDICINES – THE LOCAL SCENARIO

T. M. S. G. Tennakoon*

Research & Development / Quality Assurance Manager
Link Natural Products

Sri Lanka, a small Indian Ocean island, has been famed for its rich biodiversity. The island has a total area of 65,610 square km and a multi-ethnic and multi-religious population of about 18.8 million. It possesses a remarkably rich flora of about 3500 flowering plants, out of which over 800 are endemic. According to the 1999 List of Threatened Fauna and Flora of Sri Lanka by IUCN, a total of 690 species of plants, including endemic medicinal plants were found to be threatened or highly threatened.

Traditional health care systems of Sri Lanka

The Sri Lankan public health services are completely free. Since independence, successive governments have maintained a fairly high level of public health services. The usage of plants in health and in disease is an integral part of the way of life of the majority of the Sri Lankan population. The primary health care needs of the majority of the rural people are largely satisfied by plant-based drugs. Historical records reveal that hospitals for infectious disease, convalescent homes and even veterinary hospitals existed in Sri Lanka over 2000 years ago. There are four systems of traditional medicine operating in Sri Lanka, which utilize plant based drugs - Ayurveda, Siddha, Unani and *Desheeya chikithsa*. Unless specified, the term Ayurveda generally encompasses all four systems.

More than 16,000 Ayurvedic practitioners who are registered in the Department of Ayurveda are practicing in the country. Some of them are traditional Ayurvedic practitioners and others are institutionally qualified practitioners. About 46 Ayurvedic hospitals and 230 outdoor patient dispensaries are scattered all over the island. More than 100 organizations/individuals produce Ayurvedic medicine, but only about 10 could be considered as large scale manufactures. The government has established a factory, the Ayurvedic Drugs Corporation, for manufacturing Ayurvedic medicine. All Ayurvedic drug manufacturers have to be registered in the Department of Ayurveda and should renew their registration annually.

Cultivation of Medicinal Plants

A growing population, increasing popularity of herbal medicine, the commercialization of manufacture, diminishing forest cover, all contribute to the tremendous pressure on existing resources of medicinal plants. A programme to systematically cultivated medicinal plants is urgent and imperative. Many plants which were considered common, two decades ago, such as *Coscinium fenestratum*, *Aegle marmelos*, *Munronia pinnata* to mention a few, are considered rare today. In Sri Lanka except in a few cases, there is no organized commercial cultivation of medicinal plants. It has been shown that some of the species with a high demand can be successfully cultivated in Sri Lanka. Some of the constraints in implementing cultivation programs are the following : lack of information on national requirements; cultivation technology; quality standards; cost of production; income and profits and unorganized marketing; shortage of planting material; suitable varieties; and low competitiveness with other agricultural crops.

The Sri Lanka Project on Conservation and Sustainable use of Medicinal Plants, promoted the development of technologies and the commercial cultivation of a few selected plants. The programme was a success. Research grants were provided to research institutes and universities to carry out micro propagation and agronomic research on selected medicinal plants species. Propagation techniques for 20 species such as *Solanum xanthocarpum*, *Piper longum*, *Plumbago indica* and agronomic practices for some short-term species have been developed.

Raw materials for herbal medicine

Over 500 plant species of which about 150 are in common use, are listed in these traditional systems. Some of the medicinal plant raw materials used for traditional medicines have been collected from the wild, and many have been imported from India. Most of the families living close to the natural forests collect medicinal plants, but there are no estimates of the total quantity of medicinal plants used annually in

* Based on the Country paper of Sri Lanka presented by T.M.S.G. Tennakoon, Research & Development / Quality Assurance Manager, Link Natural Products, at the UNIDO - Regional Training Course on Herbal Drug Industry for compliance with quality parameters, New Delhi, India, 2004

the country, or their prices. In 2003, plant materials amounting to Rs 125 million were imported from India. The crude drug import business is controlled by the private sector. The quality of the raw materials used has a direct effect on the quality of the final drug. Many problems are encountered in the identity, purity, quality and strength of raw materials. The *ad hoc* substitution of one plant for another is a common problem. Non-permitted substitutes are used as adulterants, and methods for their identification need to be developed. For example, *Cupressus macrocarpa* Hartw. Ex Gord, and *Myroxylon balsamum* (L.) Harms. are common adulterants, respectively, for *Pterocarpus santalinus* L.f. and *Acacia catechu* Willd in Sri Lanka.

Preparation Technology

Ayurvedic preparations are classified according to the type of preparation, as *Arista* (fermented decoction), *Kwatha* (decoction), *Kalka* (pills), *Thaila* (medicated oils), *Choorna* (powders) etc. Traditional Ayurvedic drug manufacturing methodologies are used by cottage level manufacturers. Today, Ayurvedic drug manufacturing is commercialized and highly competitive. Traditional process control methods and quality parameters are not adequate for large-scale industrial drug manufacturer. Accordingly, manufacturers should modify the processing, and quality control methods by using modern technology and science. Raw material processing such as cutting, chopping, grinding, and sieving are carried out by electrically operated machines while steam-jacketed vessels are introduced to enable controlled extraction. Research should be conducted to develop the most appropriate modern technology without affecting the quality of the drugs.

Quality assurance of herbal medicine

There are no universally accepted methods for the quality assessment and quality control of crude drugs or finished products. Further, there are no accepted quality standards for manufactured traditional medicine. Therefore, it will be no easy task to formulate them. Recently, certain private sector industries have undertaken the challenge, and now use modern scientific and technological methods to develop standardized herbal health care products for consumer use. Modern instrumental analytical methods can be adopted to enable quality assessment and control, but it is a challenging task to do so.

R&D Activity

There has not been much research on traditional medicines and as a result scientific and technological inputs have not been used to develop these products. Several impediments can be identified, which have a bearing on R&D in the traditional system of medicine. They can be summarized as follows;

- o The lack of information on social and economic benefits; as a result the real potential of these plants has not been tapped by government or private sector
- o No proper planning of research on medicinal plants and finished products
- o Lack of a cross-disciplinary approach in research.
- o Research not directed towards innovative formulations to suit the local needs.
- o Lack of institutions with a dedicated focus on R&D on medicinal plant derived pharmaceuticals.
- o Sri Lankan scientists who are engaged in research on medicinal plants, concentrate on isolating bio-active principles; this approach is more related to discovering new drugs for modern medicine
- o Shortage of qualified and trained scientific personnel and no collaborative R&D activities between universities and industries.
- o Lack of market information on medicinal plants; e.g.: availability, habitats etc. Need for economic mapping of the spontaneous flora.
- o Attitude of the Ayurvedic Practitioners who swear by the original methods as coming from the sages, and insist that these should not be questioned or altered.
- o Lack of funding and sponsorship of R&D in this area.

The man is not sick because he has and illness. He has an illness because he is sick.

- Old Chines proverb

The Company Link Natural Products

Link is a totally Sri Lankan company that produces over two hundred products including Traditional Ayurvedic products, herbal health care products, spice essential oils and oleoresins. The company obtained ISO 9001:2000 certification for quality management system and ISO 14001:2002 for its environment-friendly practices.

The R&D centre of the company and its laboratory for QA/QC, are fully equipped with modern state-of-the-art facilities, equipment (HPLC, GC TLC Densitometer, UV/VIS spectrophotometers), and pilot plants. The QA/QC facility closely monitors and controls the raw materials used, the processing operations as well as the finished products to standards that are fully acceptable at international market level.

Research and development is conducted by a multidisciplinary team, of professional scientists, technologists and eminent Ayurvedic practitioners. New products are formulated based on ancient Ayurvedic wisdom and modern science, using environmentally preferred modern technologies involving multidisciplinary teams of the company.

Link is grateful to the UNIDO for inviting the Company to participate in its programmes. The opportunity would be beneficial for the future development of the company as well as to enhance the broader utilization of the Ayurvedic System in healthcare. The experience gathered will enhance natural product industries in Sri Lanka.

MOSQUITO'S COMPLAINT

*A mosquito was heard to complain
That chemists had poisoned his brain
The cause of its sorrow
Was paradichloro
Diphenyl trichloroethane*

And.....

*Nowadays the poor fella
In southern Sri Lanka
Contentends with
Preparations of oils of Citronella!*

THE PATIENT'S PREDICAMENT -

A commentary on the National Healthcare System

1. Government institutions (both allopathic hospitals and Ayurvedic ones) are agonizingly in need of funds for normal operational work.
2. Institutions are overcrowded and often short of drugs.
3. Private patients are often forced to patronize private institutions at prohibitive cost.
4. National Healthcare is a tremendous drain on the nation's resources, and the state of the institutions reflects this.
5. Public confidence in government institutions is falling and even most of those who can barely afford it flock to the private institutions which are invariably run on an "amoral" profit basis.
6. The National Healthcare Service is far too dependent on the vagaries of practitioners, pharmaceutical suppliers, equipment suppliers, private institutions, doctors, and their organizations, and even political interests, and these are the major players.
7. The patient is victim of the compelling mechanism of a National Healthcare System as they are dragged into the maze of consultations, treatments, therapies, testing, instrumentation, in a world of hassle and expense.
8. The National Healthcare Service so far officially fails to make complete use of the prevailing Ayurvedic system, and proven medicaments. This is on account of the allopathic personnel not being aware of the virtues of Ayurveda.
9. For that matter, few of the many plant-derived pharmaceuticals that are well-established remedies in countries of the European Union, enter the "controlled" repertoire of therapeutic agents used in Sri Lanka.
10. Equally, a variety of herbal preparations, reputed to be "Ayurvedic", but prepared without any indication that scientific methods of quality assurance and control are applied, appear as over-the-counter products in our pharmacies and super markets.
11. The patient's predicament is a multi-faceted and complex one, which makes many feel that with illness around one can scarce afford to live!!

WHO GUIDELINES FOR THE APPROPRIATE USE OF HERBAL MEDICINES

A. The Background

In December 1997, the WHO Regional office for the Western Pacific region organized a 'Working group on Herbal Medicines'. This meeting formulated a set of 'Guidelines for the Appropriate use of Herbal Medicines' (WHO: Regional Publications WPS No. 23, Manila, 1998).

WHO's policy on Herbal medicines is quite explicit. It states as follows:

1. The WHO is fully aware of the importance of herbal medicines for the health of a large number of the population in today's world. Herbal medicines are recognized as valuable and readily available resources and their appropriate use is encouraged.
2. To promote the proper use of medicinal plants, a comprehensive programme for their identification, evaluation, preparation, cultivation, recognition as valuable and readily available resources and their appropriate use is encouraged.
3. It is necessary to make a systematic inventory and assessment (pre clinical and clinical) of medicinal plants; to introduce measures on the regulation of herbal medicines to ensure quality control of herbal products by using modern techniques, applying suitable standards and good manufacturing practices; and to include herbal medicines in the national standard of pharmacopoeia.
4. As many of the plants that provide traditional and modern drugs are threatened with extinction, WHO endorses the call for international co-operation to establish programmes for the conservation of medicinal plants, to ensure that adequate quantities are available for future generations.

B. Why are the WHO guidelines important?

In many developing countries, herbal medicines are deemed to be more accessible to the public, affordable, eventually acceptable and sustainable. Even in industrialized countries the move towards 'naturals', has made the demand for herbal medicines stronger than ever. The herbal products industry is now of the multi-billion dollar dimension.

Though clinical experiences built over centuries provide a substantial basis for the safety and efficacy of the established herbal medicines, in the current context some understandable concerns arise. These concerns must be addressed if the full volume of the traditional systems of medicine are to be harnessed for the benefit of the national healthcare systems in countries such as ours. For instance, the following concerns need to be addressed:

- * Are the plant species used the authentic ones?
- * Is the post harvest treatment the optimum?
- * Has the processing closely simulated the traditional method? (If modified, is the new process scientifically a valid simulation?)
- * Is the dosage form valid and appropriate?
- * Does the dosage regimen conform to the traditional pharmacopoeias?
- * Is the process protocol adequately optimized and reproducible?
- * As regards processed herbal products, or even harvested medicinal plants, what ensures their stability, and efficacy with time and under basic storage conditions?

Steps to ensure that these concerns are adequately met will be the responsibility of manufacturing companies as much as governments and health care practitioners.

C. Advantages of factory-processing

Few would dispute the assertion that plants grown, nurtured, harvested and prepared as dosage forms, strictly according to traditional pharmacopoeias (say for instance, Ayurvedic practitioners) would be the ideal situation.

However, in the context of the current lifestyles, even in areas in Sri Lanka, where family members work in various sectors, the traditional methodology is not practically realizable.

Even if it were, some issues such as plant authenticity, post harvest practices and strict dosage control, are not always beyond question. Accordingly, factory-produced herbal medicines, subject to the regimes of Good Manufacturing Practices is the modern answer. Coupled with this, the production of

medicinal plants themselves must be governed as far as possible by Good Agricultural Practices. Collecting medicinal plants from spontaneous flora is not acceptable and is of concern, not only on the account of issues such as the importance of conservation, and likely extinction of species, but also in respect of variability in the content of secondary metabolites. Factory produced herbals would score on the basis of the following:

- * Consistency, authenticity, and quality of the raw material used
- * Consistency and reliability of the process protocols in production
- * Use of modern Quality Assessment and Control procedures
- * Convenience of improved dosage forms
- * Ease of dosage control in the regimen

D. The National Need to enhance Quality Standards

Accordingly, just as in the case of regular pharmaceuticals, herbal pharmaceuticals that are in the market as OTCs or even prescribed medicines, need to be quality certified. This will be no easy task. There are at present no established methods for analysis of quality in, for example, herbal pharmaceuticals. However, attempts are being made to establish parameters for quality assessment in India, China and the European Union countries. Much research is current for developing quality control methods and a very modest beginning has been made here in this country too. In contrast to the case of regular pharmaceuticals, where the quality tests are for the content of one or more individual chemical entities, the case of herbal pharmaceuticals presents formidable analytical problems. But given the potency of modern instrumental techniques, it is not a task that is beyond solution. For a start, simple parameters such as physical tests for consistency, (e.g. colour, specific physical characteristics, content of leading identifiable chemical entities, and what are termed 'finger print profiles' using instrumental techniques) could be developed. A decision to develop such parameters would involve the need for a major thrust in R&D towards this goal. If consumer safety is the requirement, an initiative in this direction cannot be considered anything other than timely. There are many herbal pharmaceuticals now in the consumer market. Which of these are safe and authentic is the question? Which of these are bogus and a waste of the consumer's money is another?

The decision to establish quality parameters is one for the Government. Development of such testing methodology involves Government, the manufacturing sector and the R&D community as well. The WHO and similar international bodies should sponsor research towards achieving such a goal.

Link Sponsors the Christmas Concert by the Symphony Orchestra of Sri Lanka

10 December 2005

The Symphony Orchestra of Sri Lanka (SOSL) now in its 48th year, organized its annual Christmas concert, teaming up with its sponsor Link Natural Products, at ladies College on 10 December 2005. Renowned for its breath taking classical music performed through out, this was a memorable evening of splendid classical music. Being one of the oldest Orchestras in South Asia, SOSL is the only orchestra playing western classical music in Sri Lanka.

This time the Sunera Foundation too joined hands together to raise funds to help the differently abled children in the country. Sunera Foundation took this opportunity to present a photo exhibition "The Faces Sunera", to raise awareness about this mission. Link Natural Products, known for its cutting edge modern science and ancient wisdom of Ayurveda to produce ayurvedic pharmaceuticals and herbal health care products like *Samahan*, extended its generous helping hand to a worthy cause of social welfare. The company strongly believes in fulfilling its corporate social responsibility that not only that would look good on blue print but also that would help the needy segments of the society. Just like the on going massive project to help the Tsunami victims, this too will help uplift living conditions of differently abled children in Sri Lanka. **The company hopes to combine entertainment, in its profound sense with human compassion to uplift the under privileged children in Sri Lanka, and thus contribute to build up a better tomorrow.**

- Annissa

NATURE'S WONDROUS REALM

The RAIN FOREST and its CANOPY

By Vikrama

After climbing to the crest of the *Sigiriya rock* one looks down on a carpet of green. One is looking here at the canopy of a rain forest. Like every rain forest in the tropical world, this little patch of rain forest in Sigiriya too is unique. The treetop network of leaves, vines, and branches forms a world in itself. It too is a highly unexplored realm. Myth has it that the flora in this rain forest was derived from the medicinal herbs and plants, brought from the foothills of the Himalayas and accidentally dropped by *Hanuman*, when on his mercy mission to *Ravana's* Lanka, to save the ailing *Sita*.



The canopy of a rain forest is itself a phenomenon. Atop this canopy far above the forest floor itself, flowers such as wild orchids and philodendrons bloom, unaided by the soil. It also houses its own fauna, which includes bats and birds hanging bottoms up beneath large branches. Reptiles and such creepy crawlers inhabit the forest floor itself. The buzzing insect population is in its incredible diversity, not to mention the colourful butterflies and dragonflies. However, many scientists believe the canopy to be the most active part of the rain forest. In it, plants, animals, insects, fungi, lichens, all these exist in symbiotic harmony. It is a complex system of inter-dependency.

At the present time the secrets of the canopy are little researched or understood. Indeed within the entire rain forest, there undoubtedly lie many of the invaluable secrets of nature's wondrous realm. Rain forests in the tropical regions of the world harbour chemical

entities that can help alleviate many forms of human suffering. Plants from the rain forests have formed the basis of the traditional forms of medicine such as Ayurveda. It has been noted that the *rishis* identified plants from the foothills of the Himalayas that were potent in combating human disease. Today we know that many forms of modern therapeutic agents have had their origins in plants used by traditional systems. Such drugs as quinine, reserpine, vinblastine, taxol, camptothecine, to name only a few of this vast range, originated from plants first identified from rain forests. In our own rain forests there are vast stores of such plants waiting to be researched. The *Sinharaja forest* is such an arsenal. Prospecting for such therapeutic agents, when indiscriminately carried out for mere commercial purposes amounts to piracy, and the species in the forests are endangered. Planned, goal-oriented research programmes take into account this factor of endangerment and possible extinction of species.

Plants *bioprospected* in Asian, African, Caribbean and South American rain forests have now yielded *inter alia* secondary metabolites or simply chemical entities, that are testing promisingly as cures for various forms of cancer, HIV, Alzheimer's disease, malaria etc.

Plants apart, it is now believed, that a spider's venom and an anticoagulant from the saliva of a species of bat, from the Amazonian rain forest, is likely to yield cures for hitherto incurable forms of paralyses. Modern medicine abounds with examples of therapeutic agents derived from poisonous plants and animals that originated in the rain forests. The muscle relaxant curare was originally isolated from vines that were used by primitive man as arrow poisons. The anticoagulant aggrastat came from the venom of a saw-scaled viper in the tropical forests. Chlorotoxin extracted from the venom of a scorpion species, also of the tropical rain forests, promises to be a cure for a form of brain cancer - *glioma*. Immunokine, a drug derived from the venom of a cobra species in the Thai rain forests, is used to combat multiple sclerosis. The examples are legion, where the flora and fauna of the rain forests have yielded to mankind through systematic scientific research, agents so valuable in disease control.

Many more discoveries are indeed in store if the rain forests are permitted to survive, and overcome the modern scourge of, indiscriminate "development" albeit destruction for a profit motive. Their bountiful flora and fauna should be preserved for the benefit of the future world as well, and of course the researchers to come.

It may be noted that presently 6% of the earth's land area is rain forest. 1% of that which amounts to 42 million acres is lost each year due to operations such as logging, mining, and other indiscriminate needs in the name of development and even mass scale agriculture. For example in the construction of the *Randenigala Dam*, such a mass destruction of virgin rain forest was witnessed. The natural resource that was the forest and is now the lake, is lost and gone for ever. The resource may have contained such valuable therapeutic agents that could quite well have brought economic benefit to the country besides cures for our ailments. How many plants that are currently used in Ayurveda, and indeed are in short supply, may have been destroyed in the construction of the lake and dam? The larger question begs itself: "Could this have been avoided or at least compromised?" Were those responsible mindful of this fact?

Preservation of the rain forests is no longer just a conservationist's cliché. It is a dire global imperative. Governments and multinationals who indulge in development programmes should be mindful of this, as it is one of the identified global Millennium Goals for Sustainable Development.

Presidential Pronouncements

"Ayurveda practitioners must bring out a scientific document on diseases cured by unique ayurvedic treatments. Based on this, Ayurvedic courses throughout the country can be modified.

If this happens, it will make Ayurveda more notable in countries where people still are not aware of this life science".

"The fusion of biotechnology and Ayurveda can bring substantial growth in the field of medical research and health-care".

Dr. A.P.J. Abdul Kalam
President of India

Did You Know that.....?

* The strong odour in the breath following the intake of onions or garlic is largely due to the likes of allyl methyl sulphide, or disulphide, diallyl sulphide or diallyl disulphide, and propanethiol.

Source :

Miniemi, T. *et al*: J. Food Sci. (1989), 54, 763-5
Loakso, I. *et al*: Planta Med. (1989), 53, 257-61

* Studies conducted on nursing mothers indicated that odoriferous sulphur compounds pass into the milk, following the consumption of onion or garlic. However, it was observed that the infants nursed better, when the mother's milk smelt ever so slightly of garlic.

Source :

Manella, J.A. & G.K. Beachamp (1991). Paediatrics. 88, 737-44

* Extracts of garlic, even in dilute form, have an effect on gram positive and gram negative organisms. They strongly inhibit the growth of pathogens such as staphylococci, streptococci, *B.thyphosus* and *B.enteriditis*.

Case control studies have shown that consumption of large amounts of onion and garlic in foods provides effective prevention against stomach cancer.

Clinical trials in China have shown that people who included quantities of alliums in their daily diet were at significantly lower risk of developing stomach cancer.

Corresponding studies in the US have also shown that a test group which consumed large amounts of onions was at a diminished risk of gastric cancer compared to the general population.

Sources :

You, W.C. *et al*. (1989), J. Natl. Cancer Inst. 81, 162-164
Trichopoulos, D. *et al*. (1985), Int. J. Cancer 36, 291-97
Riggen, W.B. *et al* (1983). US Cancer Mortality Rates: US Government Print Off. Washington.

OF ONIONS AND TEARS !

"Life itself is like an Onion:

It has a bewildering number of layers. You peel them off, one by one, and sometimes you cry!"

- Carl Sandburg

Onions can be regarded as the universal cornerstone of almost every type of cuisine, - Arabic, Chinese, Indian, European, Scandinavian, Greek, Italian - indeed the cuisines of every geographical region. The history of the onion as an important culinary ingredient dates back over 5000-6000 years, and is believed to have originated in the Steppes of central and western Asia. There are references to onions in the Egyptian period around 3000 BC, where paintings and inscriptions bear testimony to the fact that onions, radishes and garlic were employed in the food of workers building the pyramids. Onions, radishes, garlic belong to the "Lilly family" (Liliaceae), and the *Allium* genus. The family encompasses related species such as leeks, shallot, ramsons, chive, among others. In the Sri Lankan cuisine we commonly employ the two kinds of onions: red onions and big onions, or 'Bombay' onions. Onions found their way into European cuisine, in ancient Greece and Rome around 500 BC, but it was only in the middle ages that they became an integral part of European cuisine.



Today, onions are grown in all continents and the estimated global consumption exceeds 18 million tons. The main producer countries are China, India, the US, Turkey and Japan (1).

The Lachrymatory effect of Onions

Onions are often known for their pronounced effect of causing tears to flow from the eyes. This lachrymatory effect (from the Latin word *Lachrymalis*: for tears) is caused by chemical substances released when the onion is

bruised or cut. The onion odour is also strong only after the cells of the onion are damaged, such as when the onion is peeled, cut or crushed. The chemicals that determine the characteristic flavour of onions, release themselves when enzymes act on precursor molecules present in an intact onion. It has been found (2) that when onions are deep frozen in liquid nitrogen, chopped and mixed with an enzyme inhibitor, the powder that results, is devoid of an onion odour or characteristic lachrymatory effect. In an intact onion, the precursors of onion flavour and the enzyme that acts on them are separate from each other. The precursors are found in the cytoplasm, whereas the enzyme is located in the cell vacuoles. When the cell is damaged the enzyme and the precursors interact, triggering off the formation of flavour substances and causing tearing as well (3).

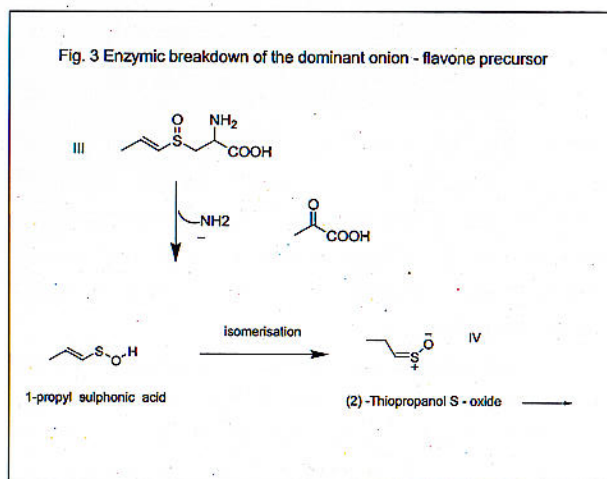
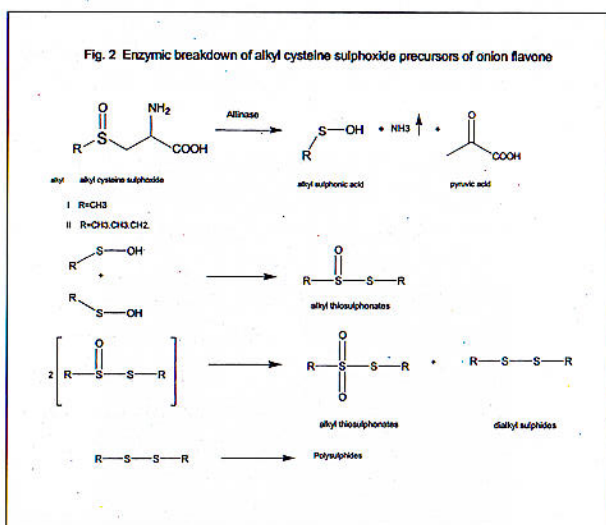
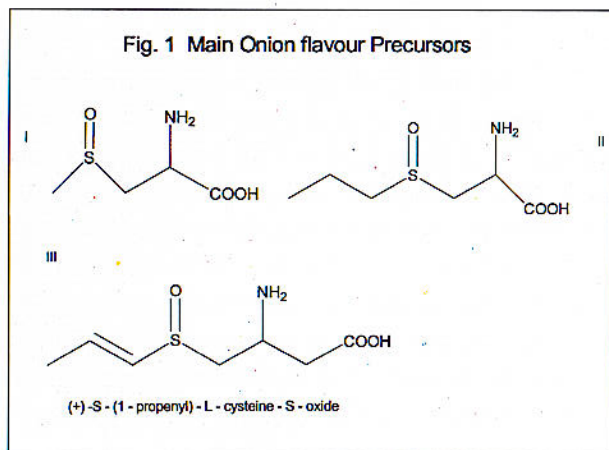
The Chemistry of Onion substances

The Nobel Laureate Artturillmari Virtanen was the first to describe the chemistry of the precursor of onion flavour (Structures I, II and III). The substances which are sulphurous amino acids derived from the amino acid cysteine, are split by the enzyme allinase giving pungent, volatile, organosulphur compounds with intense lachrymatory effect.

The most significant of the onion flavour precursor is III. It has the dominant influence on the onion flavour. Its enzymatic breakdown differs from that of the alkyl cysteine sulfoxides (II). However, the typical onion odour is caused by the thiophinates produced by the breakdown of the various other precursors.

The formation by the isomerisation of 1-propenyl sulphonic acid of (z)-thiopropenyl sulphoxide (4) is what causes one's eye to tear when chopping onions; every housewife and cook encounters this phenomenon. However, a few minutes after first chopping the onions, the concentration of this lachrymatory substance reaches the peak concentration. It is an unstable compound and self-destructs within the hour giving propionaldehyde, H₂S and sulphur compounds.

Recent studies by Sabatier and Widder have demonstrated that 3-mercapto-2-methylpentanol (5) is one of the most intense flavour substances in the onion. Thiopropanol s-oxide(iv), the intermediate in the breakdown pathway, the lachrymatory pungent substance, is a significant intermediate in the formation of this and other flavour substances.(2)



REFERENCES

1. Widder, S & Sabatier, C (2002). Dracoco Report. No.1.March 2002, 4
2. Freeman, CG & Whenham, J (1976). Flavour. Sept-Oct 1976, 222
3. Lancaster, JE & Collin, HA: Plant Sci. Lett. (1981), 22,169
4. Virtanen, AI & Matikkoale, EJ (1959): Acta. Chem. Scand. 13, 1898 ff
5. Virtanen, AI & Spare, CG (1961). Siiomen Kemistilehti B. 34, 72 ff
6. Carson, JF (1987). Food Reviews International. 3,71
7. Black, E (1992). Angew. Chem. 104, 1158

OF ONIONS AND WELLBEING

* The value of onions was known to the ancient Egyptians (2540-2520 BC). Cooking onion (*Allium cepa* L.) and garlic (*Allium sativum* L.) are depicted among the hieroglyphics of the Pyramids at Cheops. Herodotus has reported that the workers who constructed the monuments received meals that contained substantial amounts of both onions and garlic. The flavours were well appreciated in the food of that period together with the health benefits.

The Vikings, one of the earliest people to voyage across the seas, carried aboard their vessels liberal supplies of onions and garlic. They were aware of the health benefits as well as the methods of storage that enabled them to maintain the onions in good condition.

Source :

Wilson, H: Egyptian Food and Drink (1988). Shire Publications Ltd, Cromwell House, Aylesbury, 1988.

BACOPA MONNIERA - A 'SMART DRUG' ?

Thilanka Wijesinghe
Faculty of Science
University of Colombo

The plant kingdom represents a source of potentially beneficial agents, namely phytochemicals. It is a potential 'gold mine', whose treasures have yet to be fully exploited. *Bacopa monniera* is one such plant.

Bacopa monniera, also referred to as *Bacopa monnieri*, *Herpestis monniera*, Water hysop, Moneywort, "Lunu-wila" (Sinh) and "Brahmi", has been used in the Ayurvedic system of medicine for centuries. A member of the Scrophulariaceae family, it is a small, creeping herb with numerous branches, small oblong fleshy leaves, and light purple (white) flowers. In India and the tropics it grows naturally in wet soil, shallow water, and marshes. The herb can be easily cultivated if adequate water is available and the entire plant is used medicinally.

Traditionally, *Bacopa* is used as a brain tonic to enhance memory development, learning, and concentration in children, and to provide relief to patients with anxiety or epileptic disorders. The plant has also been used in India and Pakistan as a cardiac tonic, digestive aid, and to improve respiratory function in cases of bronchoconstriction.

Many biologically important compounds are found to be responsible for the pharmacological effects of *Bacopa*. Compounds isolated from *Bacopa* include alkaloids, saponins, and sterols. The alkaloids Brahmine and herpestine, saponins, d-mannitol and hersaponin acid A, and monnierin - were isolated in India over 40 years ago. Other active constituents that have since been identified, include betulic acid, stigmasterol, beta-sitosterol, as well as numerous bacosides and bacopasaponins.

Since *Bacopa's* primary therapeutic use is to enhance cognitive function, specifically memory, learning, and concentration, most research has focused on the mechanism behind these properties. The triterpenoid saponins and their bacosides A and B are found to be responsible for *Bacopa's* ability to enhance nerve impulse transmission by aiding in repair of damaged neurons by enhancing kinase

activity, neuronal synthesis, and restoration of synaptic activity, thus supporting the traditional ayurvedic claims.

Bacopa's traditional use as an anti-anxiety remedy in Ayurvedic medicine is being supported by evidence from both animal and clinical research. Research using a rat model, of clinical anxiety, demonstrated that a *Bacopa* extract of 25-percent Bacoside A, exerted anxiolytic activity comparable to Lorazepam, a common benzodiazapene anxiolytic drug. Importantly, the *Bacopa* extract did not induce amnesia; side effects associated with Lorazepam, but instead had a memory-enhancing effect.

Although *Bacopa* has been indicated as a remedy for epilepsy in Ayurvedic medicine, research in animals shows anticonvulsant activity only at high doses over extended periods of time.

Animal studies have also demonstrated that *Bacopa* extracts have a relaxant effect on



chemically- induced bronchoconstriction, probably via inhibition of calcium influx into cell membranes. These studies indicate the potential usefulness of *Bacopa* extracts in bronchoconstrictive and allergic conditions, and warrant human studies.

In vitro and animal studies have also demonstrated that *Bacopa* extracts may have a protective effect against negative side effects of certain drugs. Thus, experimental results demon

strate that *Bacopa* can protect against changes in hepatic antioxidant status mediated by morphine in rats. *Bacopa* has also been shown to decrease the toxicity of morphine and phenytoin in animal models.

Another important fact is that, therapeutic doses of *Bacopa* are not associated with any known toxic side effects, and *Bacopa* has been used safely in Ayurvedic medicine for several hundred years. Therefore, further systematic explorations on this 'potential gold mine' - *Bacopa monniera*, to not only validate the claimed therapeutic benefits, but also to discover hitherto unreported properties that may help to enhance its medicinal value, is undoubtedly, worth a try.

REFERENCE :

1. Mukherjee, DG, Dey, CD. (1966). Clinical trial on Brahmi. I. J Exper Med Sci.10 pp5-11
2. Kapoor, LD (1990). CRC Handbook of Ayurvedic Medicinal Plants. Boca Raton, FL: CRC Press Inc. p61
3. Singh, HK, Dhawan, BN. (1997). Neuropsychopharmacological effects of the Ayurvedic nootropic *Bacopa monniera* Linn. (Brahmi). Indian J Pharmacol. 29 p359-65
4. Martis, G, Rao, A. (1992). Neuropharmacological activity of *Herpestis monniera*. Fitoterapia 63 p399-404
5. Vohora, D, Pal, SN, Pillai, KK. (2000). Protection from phenytoin-induced cognitive deficit by *Bacopa monniera*, a reputed Indian nootropic plant. J Ethnopharmacol. 71 p383-90
6. Encyclopedia - http://en.wikipedia.org/wiki/Bacopa_monnieri

ANISOMELES INDICA - A LITTLE PLANT WITH BIG POTENTIAL

Ira Thabrew

Department of Biochemistry & Clinical Chemistry
Faculty of Medicine,
University of Kelaniya, Ragama



Anisomeles indica Linn., *Nepeta ambolonica* Linn. f., *Nepeta disticha* Bl., *Ballota disticha* Linn., *Anisomeles ovata* Br., *Anisomeles glabrata* Benth., *Anisomeles mollissima* Wall., *Ajuga disticha* Roxb., *Morrubium indicum* Burm., *Morrubium odoratissimum* Burm., *Monarda zeylanica* Burm., *Phlomis alba* Blanco., *Phlomis indica* Blanco, is a little known plant belonging to the family Lamiaceae that is used in traditional systems of medicine - in Sri Lanka and some other Asian countries [1]. The vernacular names of the plant are *Yakwanassa* in Sinhala, *Peyameratti* in Tamil, *Chodharo* and *Gopali* in Gujarati, and *Chedayan* in Malay [1,2]. The plant is a large

perennial herb that flowers between July and September each year. It grows as a weed in waste places, roadsides, forest clearings and shrub jungles of Sri Lanka, India, Malaya, China and the Philippines [1,2,3].

Traditional uses of *A. indica*

A decoction of the leaves and stems of the plant is used by Ayurvedic practitioners in Sri Lanka to treat pains and rheumatic joints, and in the Dutch East Indies, to treat kidney stones. The juice of the leaves is also used in Sri Lanka for the treatment of colic dyspepsia and fever due to teething in children [1]. In the *Deshiya Chikitsa* System of medicine in Sri Lanka, leaves and immature stems of *Anisomeles indica* are often used as an ingredient in different drug formulations, many of which are used as vehicles (*Anupanaya*) to dissolve solid drugs such as "kalkayas" (e.g. *Buddharaja kalkaya*, *Chandra kalkaya*) and "guliyas" (e.g. *Heen guliya*, *Vijayaraja guliya*, *Sitharama guliya*). In the *Deshiya Chikitsa* System of medicine, these drugs are used to treat pains, fever, fits, inflammation of the upper respiratory tract, wheeze, cough etc. In addition, the aerial parts of the plant are used to treat fractures, sprains and snake bites [4,5]. According to

Chadha [3], the plant is used by the Chinese to prepare sagocake that is used as fodder. It is supposed to possess aromatic, astringent, carminative and tonic properties. A decoction of the herb is also used to treat convulsions and is applied in itches. Essential oil present in the herb is supposed to be useful in treating uterine affections. The plant is burnt to repel mosquitoes. Two diterpenoids ovatodiolide and isoovatodiolide have been isolated from the leaves while stigmasterol and β -sitosterol have been isolated from the roots [3].

Recently discovered novel therapeutic properties of A. indica.

Recent *in vivo* studies with rats while confirming that a decoction (prepared from the leaves and stems of *A. indica*) could exert significant analgesic, anti-hyperalgesic [6], anti-inflammatory [7] and diuretic effects [8] without producing any serious toxic effects, thus rationalizing the ethnopharmacological uses of this plant, have also demonstrated that it has certain hitherto unreported medicinal properties that would increase its medicinal value. Thus, experiments with rats have shown that *A. indica* contains components that can, not only exert mild hepatoprotective and moderate hypoglycemic effects, but also potent gastro protective effects [9].

With respect to gastro protection, *in vivo* studies have shown that the *A. indica* decoction can significantly protect rats against gastric lesions induced by ethanol or indomethacin [9]. *In-vitro*, the decoction has been demonstrated to significantly inhibit the growth of 13 out of 16 strains of *Helicobacter pylori* [10].

An interesting finding during the above investigations was the fact that the pharmacological activities in this plant alter with the stage of flowering. Thus, anti-inflammatory, analgesic, antihyperalgesic, diuretic and gastroprotective effects were confined to the pre-flowering stage, while hepatoprotective activity was observed only in the flowering plant. Hypoglycaemic activity was common to both stages, but was more potent after flowering [9].

REFERENCES

1. Jayaweera D.M.A (1981). Medicinal Plants Used in Ceylon III, p. 109, National Science Council of Sri Lanka (Colombo).
2. Chadha YR (1985). Wealth of India, A dictionary of Indian raw materials and industrial products. vol.1, p.277., Publications and Information Directorate Council of Scientific and Industrial Research (New Delhi).

3. Dassanayake M.D. and Fosberg F.R. (1981). A revised hand book to the flora of Ceylon III, 176 - 178. Amerind Publishing Co. Ltd., (New Delhi).
4. Waydyaratne S.S.T (1927). Wateeka Prakaranaya, PJ Karunadhara, Kalutara.
5. Kumarasinghe A, Fernando W.I, Jayasinghe D.M, Seneviratna R.D.A, Dissanayake D.M.R.B, Wijewardena K. H. C, Ratnayake M.B. (1984). Deshiya Chikitsa Sangrahay, vol.1, Department of ayurveda (Colombo).
6. Dharmasiri, M.G., Ratnasooriya, W.D. and Thabrew, M.I. (2003) - Water extract of leaves and stems of pre-flowering, but not flowering plants possess analgesic and anti-hyperalgesic activity in rats. *Pharmaceutical Biology* 41, (1), 37 - 44.
7. Dharmasiri, M.G., Ratnasooriya, W.D. and Thabrew, M.I. (2002) - Anti-inflammatory activity of decoction of leaves and stems of *Anisomeles indica* at pre-flowering and flowering stages. *Pharmaceutical Biol.* 40 (6), 433 - 439.
8. Dharmasiri, M.G., Ratnasooriya, W.D. and Thabrew, M.I. (2003) - Diuretic activity of leaf and stem decoctions of *Anisomeles indica*. *J. Trop. Med. Plants*, vol 4 (1), 43 - 45.
9. Dharmasiri M.G. (2001). A pharmacological and toxicological evaluation of a decoction of leaves and stems of the medicinal plant *Anisomeles indica*. M.Phil. thesis, University of Colombo, Sri Lanka.
10. Bharmaprabati S., Mahady GB, Thabrew MI and Penland SL. (2002) - The effect of medicinal plant extracts from Thailand and Sri Lanka on the growth of *Helicobacter pylori in vitro*. *Revista de Fitoterapia* 2, 184, A 203.

WHAT THEY NOW SAY :

old sayings and new reasons

By Ayesha

1. "An apple a day keeps the doctor away", an old English rhyme
- apples have antioxidants and flavanoids which enhance Vitamin C activity and lower the risks of heart attacks and strokes.
2. "Eating raw nelli and papaya helps health maintenance", Archchi's recipe
- Nelli has more Vitamin C than many other fruits, and so does papaya. Papaya in addition has B-Carotene, a Vitamin A precursor.
3. "The 'cooling' effect of Cucurbitaceae fruits like Puhul, water melon, pipingha, bring health maintenance", Ayurvedic remedy
- They have over 90% water, but also mega quantities of glutathione which is an immune booster.
4. "Garlic helps combat ill health", universal traditional remedy
- Garlic has compounds that are deemed to block carcinogen from entering cells. Diallyl sulphide in Garlic oil has been shown to render carcinogens in the liver inactive. Studies have linked Garlic to lower the risk of stomach and colon cancer.

TRACING THE DEVELOPMENT OF A HERBAL PRODUCT

Ian A. Southwell

Essential Oil Producers Association of Australia
22 Canterbury Chase,
Goonellabah, NSW, 2480,
Australia

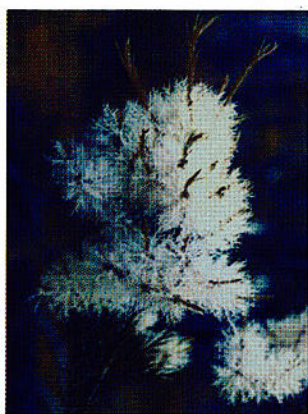


Dr. Ian Southwell

The development, or even the continued use, of a herbal medicinal product or essential oil in the twenty first century, is no easy task. In an increasingly rigorous regulatory environment, the balance between human safety and medicinal efficacy is tipping so alarmingly toward the former, that the benefits of the latter seem inconsequential. In order to prevent a repeat of drug-use catastrophes like the thalidomide birth defects, regulatory authorities are making it increasingly hard for the development of medicinal plants and essential oils.



Tea tree plantation in eastern Australia.



M. alternifolia flower

The development of the tea tree oil industry in Australia is a good example of this. The use of *Melaleuca alternifolia*, the source species, by the indigenous population is difficult to corroborate although the medicinal use of the broad-leaf *Melaleuca* is better documented. *M. alternifolia* leaf was first distilled and tested for anti-microbial properties in the 1920's.

Subsequently, oil distilled from natural stands was used commonly as an antiseptic oil. The liberal use of the medicinal oil resulted in few, if any reports of adverse affects. The industry expanded in the 1980's such that leaf supplies needed to be sourced from plantations as oil production increased over two decades to around 600 tonnes by the year 2000. During this period, significant research defined the chemistry of the leaf constituents, confirmed medicinal activity in numerous established and new areas, produced higher yielding genetic stock and identified genetic markers. Despite these advances, annual production has fallen in recent years due to over-supply and falling prices at the farm gate. Current factors, including the purchase of some large tea tree plantations for non tea tree use, are now stabilizing the industry.

With reports, in the late 1990's, of skin irritation and sensitivity to tea tree oil becoming more frequent as use increased, regulators sought to restrict the use of such products that might elicit harmful responses. A European SCCP (Scientific Committee on Consumer Products) opinion concluded that insufficient data was available on the safety and stability of the oil. As a result of this opinion, tea tree oil has recently received bad media coverage overseas through headlines stating: "tea tree oil - unsafe and unstable". The industry is addressing this situation by commissioning approved tests in order to obtain a complete safety dossier on tea tree oil. Such tests take a considerable time to perform and are very costly. Initial investigations have completed a thorough literature search of tea tree oil, determined oil stability, peroxide indices, dermal penetration, skin sensitivity studies etc. Although past toxicity tests have been performed, more detailed investigations for oral toxicity, dermal toxicity, repeated dose toxicity, reproductive toxicity, mutagenicity, skin irritation and sensitivity may also be required. In fact, the European Biocidal Products Directive lists some 41 studies to be addressed before a 2007 deadline. The Australian tea tree oil industry has been commended for a prompt attempt to satisfy the regulators and has been granted an extension of time to complete the dossier.

In addition, the status of substances derived from botanicals has been addressed by COLIPA (the European Toiletary & Perfumery Association) and the SCCNFP (Scientific Committee on Cosmetic and Non-Food Products) in relation to the fragrance allergens directive in the Cosmetic Products (Safety) Regulations and also REACH (Registration, Evaluation and Authorization of Chemicals). The presence of trace - small amounts of linalool and limonene in tea tree oil cosmetic products means that these constituents should be declared on the label as potential allergens as they are present at levels greater than 0.01% in oils and most formulated products.

The example of tea tree oil shows the increasing difficulties that are being encountered in the process of commercially developing a herbal product which has been used safely and successfully for decades.



A sample of tea tree oil products

ADDITIONAL READING

1. I.A. Southwell and R.F. Lowe (eds.), *Tea Tree, the Genus Melaleuca* Vol 9 in Series Medicinal and Aromatic Plants - Industrial Profiles (ed. R. Hardman), Harwood Academic Publishers, Amsterdam, 1999.
2. C.F. Carson, K.A. Hammer, and T.V. Riley, *Melaleuca alternifolia* (Tea Tree) Oil: a Review of Antimicrobial and Other Medicinal Properties. *Clinical Microbiology Reviews*, 19 (1), 50-62, 2006.
3. T. Burfield. *Cropwatch* 4, OPINION: The EU Biocidal Products Directive 98/8/EC and Essential Oils - The EU Machinery Gets It Wrong Again! MAY 2004. *Cropwatch* 8. *Cropwatch* responses to SCCP Opinion on Tea Tree oil. <http://www.cropwatch.org/cropwatch.htm> (last accessed on 30/01/2006).

DESERT PROMISE



Prof. Leslie Gunatilaka

Distinguished Sri Lankan Natural Products Chemist Dr. A.A. Leslie Gunatilaka is in the news again (See *Chemistry World*, March, 2006, and *Nat. Chem. Biol.* 2006,2,33).

Gunatilaka is presently the Director of Southwest Centre for Natural Products Research and Communication at the University of Arizona. Gunatilaka's latest achievement is the isolation of two chemical molecules that inhibit a protein that has been associated with cancer pathogenesis. Generally, researchers look for new chemical entities in areas of biodiversity such as rain forests. But Gunatilaka's team at Arizona adhere to the presumption that organisms living in the desert will have evolved biochemical systems to function in extreme conditions. The biochemicals involved may have activities related to other stress-related systems such as disease.

Gunatilaka and his team screened extracts from over 500 fungi associated with plants growing in the Sonoran desert in South-West USA. The team tested the extracts using a series of specific bioassays designed to assess inhibitory properties against heat-shock proteins, designated hsp90. This is the key molecule in metabolic and signaling pathways in cancerous cells. The hsp90 is believed to protect cancerous cells from environmental stress. Gunatilaka and his team isolated two compounds which inhibited hsp90. One was from a microbe associated with a plant known as "Mormon Tea". The other was a cactus referred to popularly as "Christmas cactus". The compounds isolated were RADICICOL and MONICILLIN I.

They were both shown to bind to hsp90 in vitro, and significantly reduced proliferation of cancer cells in culture.

Gunatilaka believes that the plants indigenous to the desert environment with rich and diverse microorganisms could yield interesting compounds with potential in the treatment of disease.

KNOWLEDGE ROUND UP - CULLED FROM LITERATURE

Liquorice to preserve food

The rhizome and roots of Liquorice (*Glycyrrhiza glabra*, Sinh. *Walmee*) are employed in many pharmaceutical preparations and ayurvedic formulations as well. It is particularly employed in cough mixtures but wide ranging therapeutic properties have been attributed to it in Western, Arabian, Indian and Chinese medicine.

Recently, researchers from the Higeshimaru Shaya Company have discovered evidence to believe that Liquorice could prove to be an effective natural alternative to chemical methods of food preservation. This is welcome news as chemical preservatives are becoming less popular with consumers.



The researchers have tested an extract from Liquorice (known as licochalcone A) on 17 micro organisms which are believed to be responsible for spoilage of foods. The extract was effective against all the spore-forming *Bacillus* germs, completely preventing the growth of *B. subtilis*. It was also effective against *Lactobacillus* species, and *Staphylococcus aureus*. The mechanism of its action is attributed to the ability of licochalcone A to inhibit bacterial oxygen consumption.

The research included testing the efficacy of licochalcone A, under conditions occurring in food preparation such as heat, presence of salt and proteases. Licochalcone A was effective under such conditions as well.

Makio Kobeyashi and collaborators conclude that Licochalcone A would be useful in the development of antibacterial agents for preservation of foods containing salts, such as soups, raw hams, and cheese, or fermented soya bean.

It was not effective against fungi and gram negative bacteria such as *E.coli* and *Aspergillus niger*.

REFERENCE

Makio Kobeyashi *et al.* (2002). Antimicrobial agents and chemotherapy. 26, 1226 in Chem. in Brit. (2002) August p18.

'BANDAKKA' is therapeutic

'Bandakka' or 'Okra', or botanically *Hibiscus esculentis*, is a popular Sri Lankan vegetable. In colonial times it was referred to as 'Ladies fingers'. It is gelatinous and slimy. It is not everybody's favourite, but in Indian and Sri Lankan cuisine it is a popular ingredient in curry form or in a variety of other presentations. In Africa too the 'Okra' is a component of indigenous preparations. Ayurvedic medicine recognizes it as a valuable food ingredient following disorders in the stomach.



Recently, a team of European scientists found that the slimy juice of 'Bandakka' helps inhibit a bacterium that can cause stomach ulcers and even cancer, from sticking to the stomach wall. The bacterium is *Helicobacter pylori*. The scientists conducted *in vitro* tests on samples of stomach tissue using fluorescent-labelled *H. pylori* bacteria. They found that pre-treatment of the bacteria with the juice from fresh "bandakka", followed by a mixture of carbohydrates and protein prevented the bacteria from sticking to the stomach wall. A crude mixture of polysaccharides isolated from the fresh juice also displayed such inhibitory characteristics. The scientists opine that the glycoprotein content of the okra juice is responsible for this effect. They feel that the *H. pylori* receptors are blocked with acidic sugar compounds to form a 3D complex.

The research has been conducted at the University of Applied Sciences, Wädenswil, Switzerland and the University of Erlangen, Nürnberg, Germany. The researchers predict that anti-adhesive carbohydrate containing preparations from an extract of Okra juice could function as a non-toxic food additive to help prevent stomach ulcers. But the scientists caution that okra extract would not counter an *H. pylori* infection, but could be used to minimize further bacterial colonization. The results enhance further the validity of Ayurvedic philosophy which always combines its therapies with selective food intake.



REFERENCE

Lengsfeld *et al.* (2004). *J. Agric. Food Chem.* (DOI:10.1021/jt.030666n). *Chem World*. April 2004.

Neem to fight Filaria?

Alcoholic and aqueous extracts of flowers of *Azadiracta indica* have been tested in vitro for their potential antifilarial activity against whole worm, nerve muscle preparation and microfilariae of *Setaria cervi* - the cattle filarial parasite. The effects of alcoholic and aqueous extracts were similar in nature on the spontaneous movements followed by reversible paralysis of the whole worm and nerve muscle preparation. Both extracts had almost similar lethal effects on the microfilariae.

Does *Azadiracta indica* act in a similar fashion on *Wucheraria bancrofti*, the human filarial parasite?

REFERENCE

Mishra, V. *et al.* (2005). Antifilarial activity of *Azadiracta indica* on cattle filarial parasite *Setaria cervi*. *Fitoterapia*, 76,1,54-61

Dangers of Antibiotics

Widespread use of antibiotics is deemed responsible for many so-called 'civilization diseases', such as, for example, Chronic Fatigue Syndrome (CFS). 80% of CFS patients have a history of repeated antibiotic use.

REFERENCE

Bauman, DS & HE Haglund (1991). "Polysystem Chronic complainers" *Journal of Advanced Medicine*, 4(1).

DID YOU KNOW OF.....

The detrimental effects of the use of antibiotics ?

- * Antibiotics create chronic infections and allergies.
- * The appearance of antibiotic resistant bacteria is catastrophic
- * Many bacteria that cause infections of the respiratory tract, skin, bladder and large intestine are resistant to common antibiotics.
- * The random elimination of beneficial bacteria allows opportunistic bacteria such as *Candida albicous*, whose waste products inhibit the efficient functioning of the immune system, to spread.
- * Antibiotics suppress immune responses and increase chances of recurring infections.

Sources :

1. Michael A. Schmidt, L.H.Smith and K.W. Schnert (1993). "Beyond Antibiotics" Berkely, University of California.
2. H.L. Neu (1992) The crisis in Antibiotics Resistance. "Science" 257, 1064-1073

Everything is poisonous and nothing is without poison; The dose alone prevents something from being a poison

- Paracelsus

The Digest Mail Bag

Letter 1

The first issue of the Link Natural Products Digest has just landed on my desk and I thank Link for sending it to me. From the Digest, it sounds as if Link is doing well.

My career changes shortly as on October 2005. I retire from my current job with the NSW government and become a private consultant. Also, I have taken on the position of Secretary/Treasurer of EOPAA (The Essential Oil Producers Association of Australia).

Dr. Ian Southwell,
Principal Research Scientist -
Chemical Ecology & Essential Oils,
NSW Dept. of Primary Industries,
Australia.

13 Sept. 2005

Letter 2

It is good to know that some serious efforts are going into making available Sri Lanka's indigenous medicines more widely.

Alternative therapies, particularly, Chinese herbal medicines, are in fashion at present. At the same time, there is a growing demand for scientific evidence of treatment outcomes.

I understand that the Company has been provided with information on the process of registering complementary medicines in Australia. The process may be long and costly, but it provides the only legal means to enter the market. I appreciate the good quality of the Digest and enjoyed reading the articles. Congratulations.

Dr. Indra Gajanayake, Australia
<ingaj@apex.net.au>

2 Oct. 2005

Letter 3

Thank you very much for my copy of the first issue of the LNP Digest - thoroughly interesting and informative. This is surely the 'way-to-go' for us 'underdeveloped' people in 'underdeveloped' nations, and how very wrong we were (are) to be 'hankering after' the western way of life, their customs, products, their foods and 'health systems'.

I am so pleased that you are helping guide Link

in its very appropriate directions towards a return to natural wellness. I shall be very pleased to subscribe to the LNP Digest and will look forward to receiving it regularly.

Dr. Ray Wijewardena, Colombo
<raywijewardene@yahoo.com>

19 Sept 2005

Letter 4

I received the Link Magazine recently. Samahan is very popular here in Toronto and is sold in all Sri Lankan grocery stores of which we have so many. This is really an excellent product you have developed and much used by everyone. I am glad that your research has really taken fruit in establishing this industry and it must give you a lot of satisfaction to see it grow.

Grace Ranjana Curtis, Canada
<Grace_Curtis@avivacanada.com>

23 Aug 2005

Letter 5

9th International Congress on Ethnopharmacology

Greetings from Beijing. I have got your information via the Link Natural Products Digest. I have just been elected as an Academician. I work as Honorary Director, IMPLAD, and a Professor as well.

Please note that the 9th International Congress on Ethnopharmacology will be held from 23-26 August 2006, at Nanning, Gungxi Zhuang Autonomous Region (websites: <http://www.sctr-cm.com> and <http://www.implad.ac.cn>).

You and Sri Lankan colleagues are welcome.

Prof. Xiao Peigen
Honorary Director
Institute of Medicinal Plant Development (IMPLAD)
Beijing, China
<xiaopg@public.bta.net.cn>

01 April, 2006

Editor's note: Link Digest congratulates Prof Peigen on being elected as Academician.

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, phytochemical 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. Wijsekera,
Editor-in-Chief
Link Natural Products Digest
e.mail : robw@linknaturalproducts.com

Post : **Dr. R.O.B. Wijsekera**
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.

Acknowledgement

The Editor wishes to acknowledge the comments and assistance provided by Prof. M. I. Thabrew

