

AYURVEDA'S STIMULUS TO MODERN THERAPY

By VIKRAMA



Col. Sir Ram Nath Chopra,
pioneer scientific researcher on Ayurveda

Preamble

During the early decades of the twentieth century the renowned pharmacologist of India, Col. Sir Ram Nath Chopra, working at the Calcutta School of Tropical Medicine pioneered a research movement making a scientific study of the properties of medicinal plants which were in use in the Ayurvedic system of medicine. Sir Ram Nath commenced a tradition that came down the ages where Ayurvedic therapeutic agents were researched by many chemists and pharmacologists in the sub-continent, in Britain, and even elsewhere. The research tradition he established bore results that are evident today clearly enshrined in the therapies of modern medicine. Fortunately, the Chopra Archives are now lodged safely at the Regional Research Laboratory in Jammu-Kashmir. The Chopra tradition influenced research on medicinal plants throughout Asia and mostly within the British Commonwealth. In modern times this tradition had even influenced the direction of drug research in Europe and the United States, and particularly in Germany.

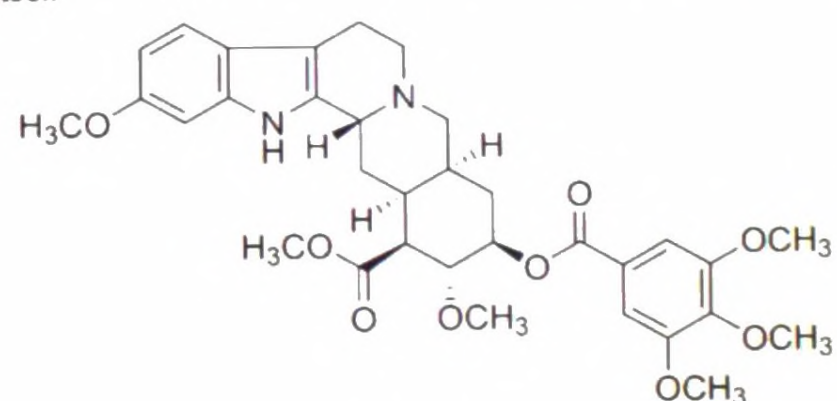
Natural Product chemists and pharmacologists, trained in western countries at first commenced evaluating the chemical constituents of plants used in Ayurvedic therapy and brought into the limelight of scientific evaluation a host of new chemical entities with remarkable biological activity. Many came to be fully developed as therapeutic agents now employed in modern therapy.

Some illustrative examples of scientific research into Ayurveda, from a host of such that has benefitted modern medical therapy, will now be discussed.

The Case of Rauwolfia

The case of *Rauwolfia serpentina* Benth., is a saga on its own. The roots of this plant, known locally as Sarpaganda., had been used in Ayurveda for the treatment of insanity for several millennia. In olden days certain symptoms now recognized as severe hypertension, came to be regarded as a type of insanity, for which allopathic medicine of the day had no remedy. Ayurveda at the time, this is even during the decades between the two world wars, did have the ability to respond satisfactorily to this form of malady by way of decoctions of the root of sarpaganda.

Rauwolfia serpentina became in the decade of the 1950's, the wonder drug of the time- as far as western medicine was concerned. For types of hypertension where the symptoms were akin to mental disease western medicine had little to offer. The plant was first scientifically investigated in pre-partition India, by the celebrated Pakistani chemist Salimuzzuddin Siddiqui. Dr. Siddiqui isolated the main alkaloids and then collaborated with the Swiss chemists led by Emil Schlittler, to elucidate the structures of Reserpine and Ajmalicine. Reserpine and the accompanying array of alkaloids were thereafter used in modern medicine as a treatment for acute hypertension, until superseded recently, by more suitable synthetics based on the main reserpine structure. However the side effects noted with reserpine, to counter for which the improved synthetic structures were modeled, were not evident in the total extract of the plant itself

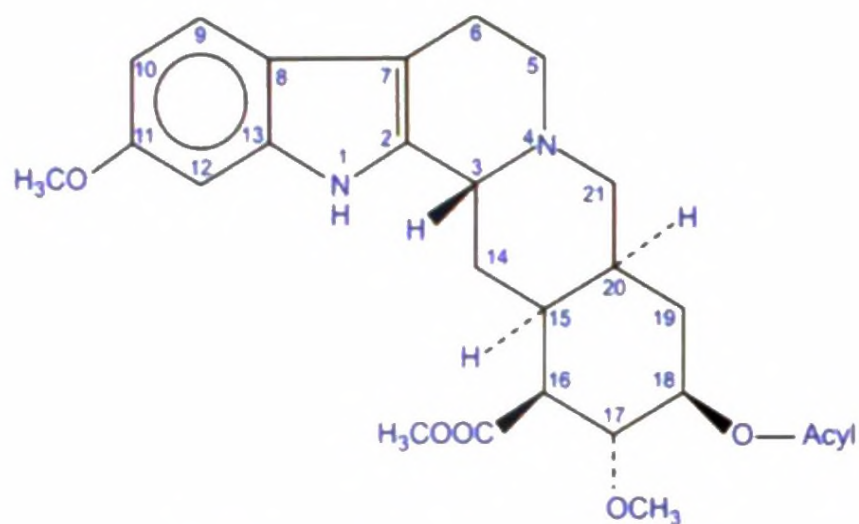


Reserpine

In Ayurveda the water extracts known as: "Sarpaganda gnanavati", is even used to this day in the treatment of symptoms akin to hypertension. This prompts the issue that the pharmacodynamics of the extract warrants study to make a more suitable delivery form for modern use. There are many instances where the plant extract itself is found to be more efficacious than any of its isolated chemical constituents.



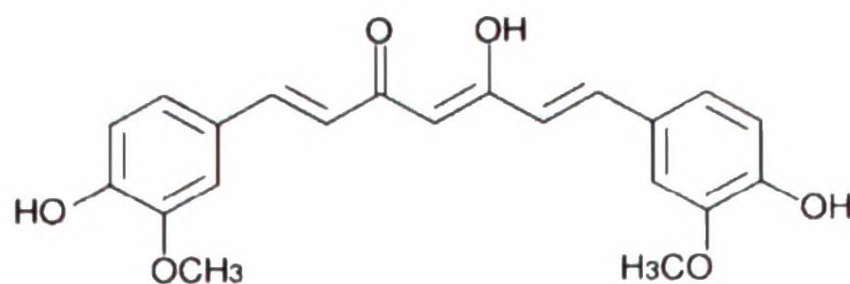
Rauwolfia serpentina



Alkaloid	Acyl
Reserpine	3,4,5-trimethoxybenzoyl
Rescinnamine	3,4,5-trimethoxycinnamoyl
Syrosingopine	carbethoxysyringoyl

The chemical scaffolding of the reserpine alkaloids have been used to synthetically modify them to generate the drugs that are used today.

The multiple benefits from Curcuma



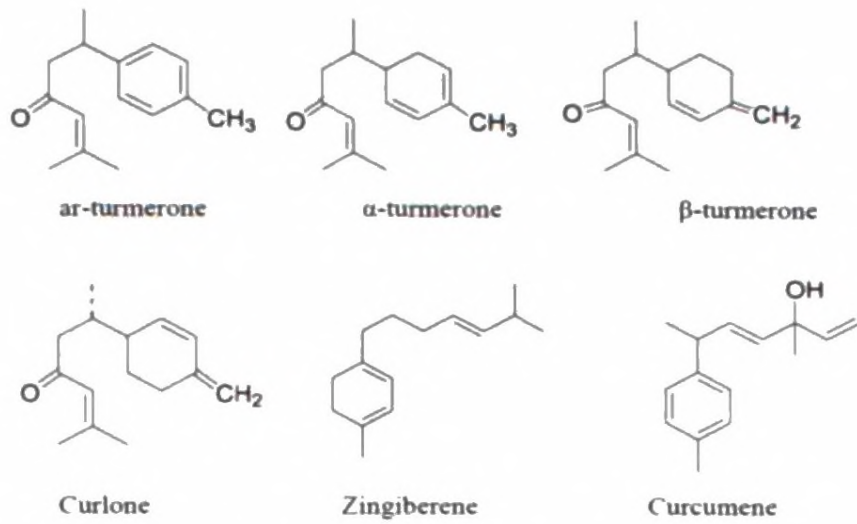
Curcumin

Curcuma longa of the family Zingiberaceae whose rhizomes are commonly known as an important spice ingredient is extensively used in Asian foods. In the early work of Ram Nath Chopra and others, the medicinal properties of Curcuma were amply illustrated. Known commonly as Kaha (Sinhala), Haldi or Haridra (Hindi), and Manchal (Tamil), the plant which belongs to the Ginger family, is one which is widely used in Ayurvedic medicine. Its value in wound-healing, as an anti-inflammatory agent, used in the characteristic preparations such as the Ayurvedic "Paththus", as well as its carminative effects, were well known in Ayurveda. Modern scientific research has demonstrated convincingly its wound-healing, anti-inflammatory, and anti-mutagenic activities, and extracts and substances isolated from it, such as curcumin and turmerone, as well as the essential oil distilled from it, curcuma oil, are now utilized in modern pharmaceutical preparations. Modern research also shows that it has significantly beneficial effects in certain pre-cancerous conditions. Curcumin has also been shown to reduce plaques in Alzheimer's disease in animal experiments, and this is reckoned a significant lead in the search for a therapy for Alzheimer's syndrome.

The significantly lower incidence of Alzheimer's disease in populations that have curcuma in their food is reckoned as an epidemiological indicator of the role of curcuma in countering this dreaded disease.

The anti-oxidant properties of the curcuma extracts too are being now demonstrated in several laboratories worldwide. Researchers at the MD Anderson Cancer Center have attributed a diverse array of beneficial properties to Curcumin and conclude that it is one of the most powerful chemical preventive and anti-cancer agents.

Besides curcumin, several other chemical constituents of curcuma too have been associated with health benefits and this accentuates what epidemiological evidence has unequivocally demonstrated that people who incorporate the spice in their diet can reap the rewards such as a lower incidence of such diseases as cancer, Alzheimer's disease, rheumatoid arthritis, and myocardial infarction.



Some constituents of *Curcuma*

***Tinospora cordifolia* Hook – a sheet anchor of Ayurvedic therapy**



Tinospora cordifolia vine

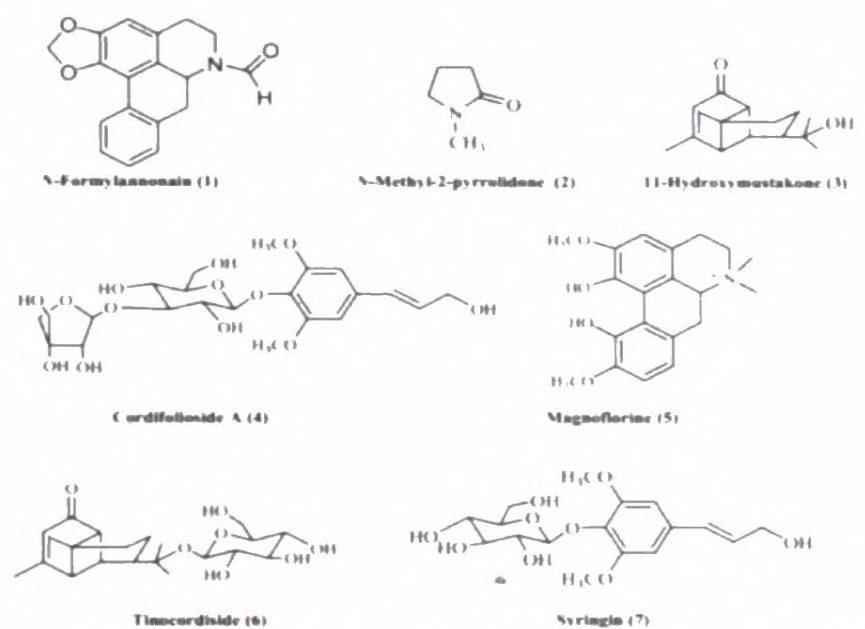


Tinospora stems used in therapy

This plant known locally as Rasakinda (Sinhala), Chintil (Tamil) and Guduchi (Hindi) is generally used in Ayurvedic therapy to treat fevers of various origins and counts beneficial experiences. The plant belongs to the Menispermaceae family, and is a climbing vine. In regard to its perceived action it is important to comprehend the Ayurvedic concepts

of anti-fever, and the mechanisms of countering it as a disease entity and not as a mere symptom. The concept of stimulating the body's own immune system emerges from this, and the drug is representative of the class now identified in modern medical terms as an immune-stimulant.

Researchers led by the late Pharmacologist, Mme S.A.Dahanukar and her team in India have carried out considerable pharmacological work on this drug and established its effectiveness as an immune-stimulating agent. A polysaccharide fraction isolated from this plant has displayed immunological activity, and a mitogenic effect on beta-lymphocytes of the spleen. A standardized herbal formulation from *Tinospora* administered before and after cancer chemotherapy has led to the reduction in the incidence of nausea, and vomiting.

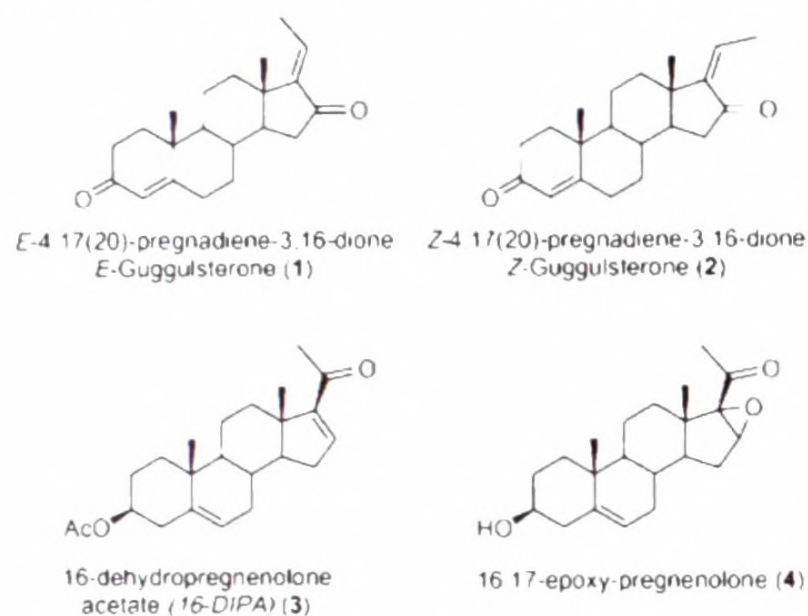


A variety of chemical entities have been isolated from the plant but the bioactivity of the plant extract itself cannot be completely attributed to any one of them. The immune-stimulating activity could be due to some of the soluble polysaccharides also found in the plant together with the other compounds. Research on this activity is far from conclusive save the fact that the whole plant in the form of modern preparations such as capsules finds ready acceptance. It has also been studied as a potent source of antioxidants.

The Resin of the Guggul Tree



Guggul is the brownish yellow gum exudate from the tree *Commifora mukul*, a plant indigenous to the Indian sub- continent. The plant has been used in the Ayurvedic system for many years for the treatment of a wide variety of ailments including obesity as well as arthritic conditions and even reputed to be an agent for lowering the level of cholesterol in the blood. The latter effect has been researched with positive results and the effects on rheumatoid arthritis conditions have been sustained. Nithya Anand and Nithyanand an Indian husband and wife team of researchers in Lucknow developed a drug which has been successfully used in modern therapy for rheumatoid arthritis. The chemical agents are a group of steroids collectively known as Guggulsterones.



These are well characterized, and are now a developed treatment option for rheumatoid arthritis conditions.

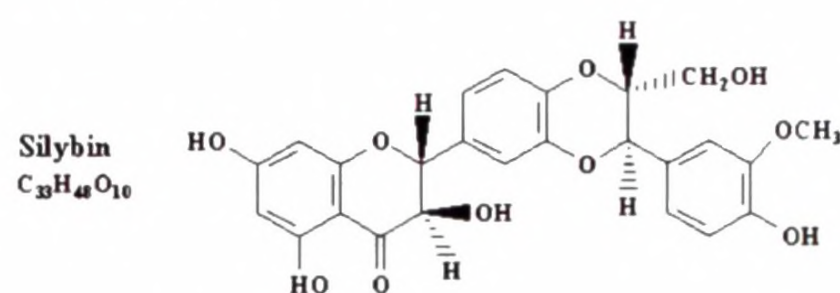
Extracts of the resin were found to lower LDL (low density lipoprotein) cholesterol levels and triglyceride levels in humans. Guggulsterones, the dominant constituents, represent a highly efficacious antagonist of the farnisoid X receptor, FXR, a nuclear hormone receptor that is activated by bile acids. Inhibition of FXR activation is considered the basis for the cholesterol lowering activity of guggulsterone.

Silimarin - a liver protective agent from Milk Thistle



Milk Thistle –*Silibum marianum* and seeds

Silybum marianum, commonly known as Milk thistle, is a plant growing in temperate zones. It has been long used in both Mediterranean and Indian cultures for the treatment of liver diseases. Its seeds contain the active ingredients dominantly silybin.

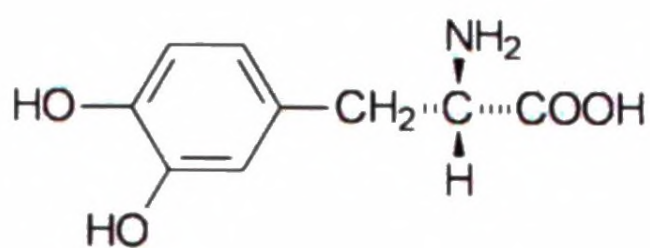


The seed extract is used as hepato-protective agent, that is to combat disorders of the liver. The composition of the extract is a complex of chemical entities related to silybin, and is known by the collective name of silimarin.

The Velvet Bean - *Mucuna pruriens*, for Parkinsonism

The seed powder of the leguminous plant *Mucuna pruriens* has found use in Ayurveda for the treatment of a variety of conditions including what is recognized as Parkinson's disease.





Chemical structure of 3-(3',4'-dihydroxyphenyl)-L-alanine (L-DOPA).

Velvet bean is an annual climbing vine indigenous to the tropical regions of Asia, Africa, and the West Indies. The seed pods are covered with reddish brown hairs that can cause intense irritation to the skin hence the Latin name *pruriens* which means itching. The seeds contain 7-10% of a compound called L-Dopa, and they have been used for a long time in Ayurvedic medicine. It has been considered as an aphrodisiac, a menstrual promoter, a uterine stimulant, and a nerve tonic, for disorders of the nervous system. It is now used in the treatment of Parkinsonian syndrome, an age-related neurodegenerative disorder that is known to affect over four million people worldwide. It is associated with progressive degeneration of the dopaminergic neurons in specific areas of the brain. While dopamine is unable to cross the blood brain barrier, and thus cannot be used directly for treatment, L Dopa is able to do so and gain access to the brain where it is converted to dopamine to address the shortcoming.

Clinical studies in India have validated the claims that the seeds indeed have aphrodisiac activity. In 2002 a US patent was filed on the use of velvet bean to promote anabolic and growth hormone stimulant properties in humans. Research cited in the patent indicated that the high levels of L Dopa in the bean were converted to Dopamine which acted as a stimulant for the release of the growth hormone by the pituitary gland. Research has also confirmed the effect of improved erection and duration of coitus in human males following oral administration. With its documented ability to increase testosterone and stimulate growth hormone, standardized extracts of velvet beans are finding enhanced demand in sports medicine, body building, and in formulas for weight loss.

A Change of Research Paradigm

The impact on research methodology that has been brought about by success in seeking leads from Ayurveda, as indeed from Traditional Chinese Medicine too, and in general from phytotherapy in Europe, is the new paradigm that now governs Natural Product research. No longer is the time-worn symbol of former research, namely the search for the single "active principle" valid. In its place the new paradigm for

research that seeks the collective activity of multiple entities, together with perceived synergistic and de-toxicant effects of the multiple components of a plant or many plants of poly-prescriptions as long known in the Ayurvedic system as well as in the Traditional Chinese systems. In the diseases too there is no longer a single target approach to address the singular symptoms. This has been replaced by the multi-target approach and has been termed Synergy Research. It has been established as a new key research activity in recent years and is primarily aimed at research to find a rational for the superiority of several Ayurvedic and other herbal drug extracts as compared to single constituents thereof. The efficacy of these herbal extracts, have been established in several clinical trials. Modern allopathic medicine is slowly moving towards the new goals within this new paradigm, in a gradual transition, from the longstanding use of mono-drug therapy. There is now the supreme advantage in the availability of a staggering range of powerful physical, chemical, analytical and instrumental aids, to assist in research and diagnosis. The growth of detective methods will continue to be phenomenal. The fundamental researches on the genome will bring new and spectacular insights on the nature of disease. It is here that Ayurveda has still to make an even greater contribution. Ayurvedic theory is in terms of modern science an unexplored area. Like in the case of Ayurvedic therapy, exploration of the theories of Ayurveda too, given the powerful tools of modern science, will bring into focus a new paradigm of research in relation to health. Medical science will take on a paradigm shift in a new direction.

A prominent modern German researcher Professor Hildeberte Wagner of Munich, puts it this way: ***"The transition to a new kind of multidrug therapy, through which the interference of drugs with protective, repair, and immune-stimulating mechanisms of the human body, rather than with single disease causing agents, gains more and more importance"***.

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A story of Sugar and our ancestral apes..

What are even the best theories, if not old stories retold in the language of science? It is said that some twenty two million years ago, Apes filled the canopy of the African Rain Forest. They survived on the fruit of the trees, sweet with natural sugar, which they ate year round – a summer without end. One day perhaps five million years later a cold wind blew through this Eden. Then the seas receded, and the ice caps expanded. A spit of land was then said to have emerged from the tides, which made a bridge that a few adventurous apes followed out of Africa. Nomads and Wanderers as they were, they then settled in the rain forests that blanketed Eurasia. But the cooling winds continued replacing tropical groves of fruit with deciduous forests where the leaves flame in autumn then die. So a time of famine followed and the woods were filled with starving apes. Dr. Richard Johnson, a nephrologist at the University of Colorado, in Aurora,



Denver, explains: "At some point a mutation seemed to have occurred in one of those apes. It made the ape a wildly efficient processor of fructose – the dominant sugar in fruits.. Even small amounts were stored as fat, a huge survival advantage, in months when winter lay upon the land and food was scarce. Then one day that ape with its mutant gene, and a healthy craving for rare precious fruit sugar returned to its home in Africa and begot the apes we see today, including the one that has spread its sugar loving progeny across the globe. The mutation was such a survival factor, that only those animals that had it survived.

As Dr. Johnson summed up: "So today, all apes have that mutation, - including us humans. It got our ancestors through the lean years. But when sugar hit the West in a big way we had a big problem. Our world is flooded with fructose but our bodies have evolved to get by on very very little of it."



Sugar Cane harvest (Jamaica)



sugar cookies

It is a great irony for the very thing that saved us could kill us in the end? For today sugar is regarded as similar to an addictive drug, and the above story perhaps explains our craving for it.

Source: Rich Cohen in the National Geographic magazine, August 2013.