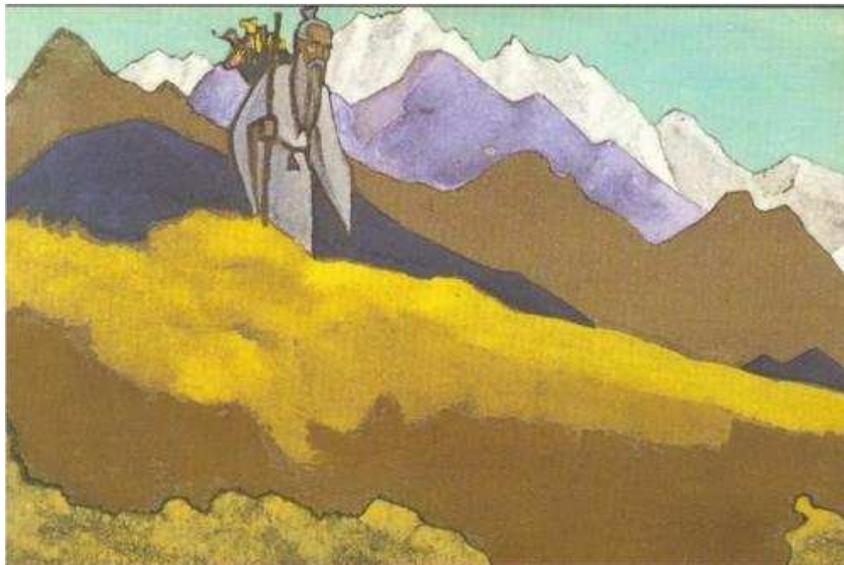


AYURVEDA

FOR THE FIRST TIME READER

By

N. Krishnaswamy



Charaka – a beautiful representation by Nicholas Roerich

A VIDYA VRIKSHAH PUBLICATION

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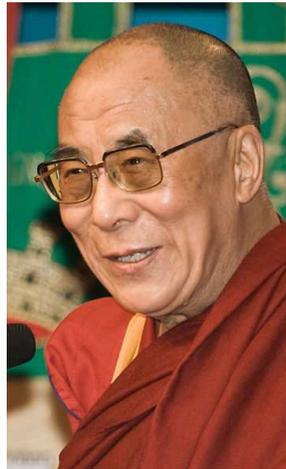
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**Humbly dedicated to
The Modern Voice of the Middle Way**



His Holiness The Dalai Lama

Acknowledgments

I owe this book to two sources. The first is the Wikipedia and its contributors, that vast and wonderful Encyclopedia, that provides instant and complete background information on every subject under the sun. This resource is simply a blessing to any writer on any subject.

My second debt is to a specific person : Dr M.S. Valiathan, National Research Professor, who today graces the field of Modern Medicine in India with distinction. His great books on the Brhad-Trayi, the Towering Trinity of Ayurveda, Charaka, Susruta and Vagbhata, have been not only a critical source, but an inspiration for my book. His books tell us, tellingly, if I may play with that word, how the world's first true physician, Charaka, and first true surgeon, Susruta, launched Ayurveda as the world's first scientifically organized system of Medicine over three thousand years ago in India. Their awesome stature notwithstanding, Charaka and Susruta remained engagingly simple ; whatever cures, they declared, is medicine, and whoever cures is a doctor.

Finally, I must affirm how deeply honoured and grateful I am to Dr Valiathan for contributing a graceful Foreword to this book.

N.Krishnaswamy

FOREWORD

In the long history of Ayurveda, the last hundred years have been momentous. From a state of bare survival in the early twentieth century, it has leapt to unprecedented heights in the twenty first century. The figures speak for themselves; India graduates nearly 30,000 Ayurvedic physicians every year; registered practitioners number 7.8 lakhs; beds in Ayurvedic hospitals exceed 60,000; annual production Ayurvedic drugs is worth 6000 crores rupees; Ayurveda is recognised world-wide as a part of Complementary and Alternative System of Medicine; it has become a brand in cosmetics, food, beverages and tourism! In the midst of this exuberance, the public understanding of Ayurveda has unhappily failed to keep face with the progress in Ayurvedic education and practice. Many publications written ostensibly to “popularise” Ayurveda have lacked authenticity and often tended to distort the role of ethics, diet, life style, medical procedures such as panchakarma and herbal formulations in Ayurveda. Against this background, Shri Krishnaswamy’s book will come as a breath of fresh air and a much needed primer in Ayurvedic education.

Shri Krishnaswamy brings to his effort a rich combination of experience and achievements. A Master’s degree in chemistry, a distinguished career in the Indian Police Service in Tamil Nadu, authorship of a series of books for the “first time reader” in many aspects of India’s cultural and religious heritage, and untiring literary productivity which defies ageing are some of the remarkable traits which characterise his post-retirement endeavour. In this book, Shri Krishnaswamy has covered in a masterly way the history of Ayurveda reaching back to the Vedas and six systems of Indian philosophy; basic concepts such as tridosha; the contributions of Charaka, Susruta and Vagbhata; other aspects of the eight branches of Ayurveda; and taken us to the interchangeability of matter and energy, the mysterious interface between mind and body, “emotion and molecules” and the consonance between spiritual experience and the findings of science. The wide range of his survey which transcends many boundaries reflects the holistic nature of Ayurveda.

Shri Krishnaswamy’s book is a product of considerable erudition which he carries lightly. It is lucidly written for the general reader who will gain an authentic and admirable picture of Ayurveda by going through its pages. I hope it will attract a wide readership which it fully deserves.

Place: Manipal
Date : 12/12/2012

M S VALIATHAN
National Research Professor

PREFACE

Lead Us From the Unreal To the Real,
Lead Us From Darkness To Light,
Lead Us From Death To Immortality,
OM
Let There Be Peace Peace Peace.
--- Brihadaranyaka Upanishad 1.3.28. ---

All investigations in the pursuit of knowledge of any kind, generally follow a bi-directional course. One direction is that of analysis and the opposite direction is that of synthesis. At each stage of either process, one takes note of features or characteristics of that stage and relate them to those of preceding or succeeding stages. At some stage, each process often needs to refer to methods of the other.

In their investigations, the ancient Rishis of India, relying on their higher perceptions, postulated a remarkable concept of Existence as One Ultimate Entity. They ascribed to it the status of the Highest Divine, which was Unmanifest, but which periodically presented itself as a Manifestation of Existence in the forms that we know. Inheriting the vast powers of manifestation from the Divine, the Manifest, from then on, proliferated into a vast multiplicity of form and function within a framework of Time and Space. In due course, however, in a stage called the Maha Pralaya, the entirety of the Manifest would dissolve and revert back into the Unmanifest state. Existence thus manifested from the Divine as a recurring Cosmic Cycle of Creation and Dissolution.

The Rishis then explained the Manifest Existence in all its forms as cycling through Time and Space through transient states of Life and Death. It would appear as if, over time, this process of proliferation itself becomes a process of creation and dissolution, much like the Cosmic Cycle initiated by the Highest Divine. Within this large perspective, the Rishis set out their perceptions in respect of all Existence, Eternal and Transient, in the four Vedas. The focus of the Vedas was on the Infinite domain of the Spiritual rather than on the Finite domain of the Physical. The Physical was therefore considered a domain of a lower order of Reality, or if one may put it that way, a higher order of Unreality. But the Rishis realized that it was necessary that we should retain a sense of perspective and accept our inevitable existence as a Finite and Transient manifestation of the Infinite and Eternal Unmanifest; that human existence is rooted in the physical domain, that is subject to the finite limitations of space and time; and therefore, that we must come to terms with its constraints and compulsions. The Rishis were persons, not only of spiritual perception but also of human compassion. They realized too

that there were hard realities of the fear of death and the suffering of pain that the common man had to cope with as long as he was part of his Finite Existence. Perceptions of a higher reality, however important, were hardly an answer to man's immediate physical needs. Man needed assurance of a long life, of good health free from disease and pain. The Rishis therefore took stock of whatever early man had discovered intuitively and instinctively to preserve himself from disease and injury. They then investigated the subject of longevity, health and medicine, through their own intuition and summed up all their findings mainly in the Atharva Veda. These findings led to the onward development of Ayurveda, which is referred to sometimes as the fifth Veda or more commonly, as an accessory or limb of the Veda, going by the names of Upaveda or Vedanga respectively .

Insofar as Ayurveda has its roots in the philosophical concepts on which the Vedas rested, it is important to have a broad understanding of those roots. It must be first noted that the Vedas presented human experience in the light of the intuitive findings of the Rishis in the context of an ultimate single cosmic vision. Over time, these findings acquired the incontrovertible status of divine authority. But the findings were expressed in terms that were much too esoteric for clear or easy understanding. They needed to be expressed or interpreted in terms that would find intellectual rather than spiritual acceptance. This spurred the development of several philosophical streams of thought that sought to explain the origin and emergence of human existence and its purpose. Six main schools of philosophy thus emerged : Nyaya of Gautama, Vaiseshika of Kanada, Sankhya of Kapila, Yoga of Patanjali, Mimamsa of Jaimini, and Vedanta of the three schools, based on the Upanishads, viz. Advaita of Sankara, Dvaita of Ramanuja and Vishtidvaita of Ramanuja. It will be useful to summarize the principles set forth by these schools and how the concepts of Ayurveda were derived from them.

Of these, Nyaya set out the logic on which all these schools rested their investigations. It prescribes four basic criteria that true knowledge must fulfill : First, Pratyaksha or Direct Perception with the mind and the senses ("it stares you in the face"); Secondly, Anumana or Inference ("a reasoned guess : where there is smoke, there must be fire"); Thirdly, Upamana, or Analogy : the three doshas, Vata, Pitta and Kapha, the determinants of health in Ayurveda, are considered to be the analogues of the three basic elements of physical existence, viz. air, fire and water; and fourthly and lastly, Sabda, or Reliable Testimony of experts or authoritative texts, such as the Samhitas of Charaka and Susruta.

The Vaiseshika School postulated an atomic basis for all physical existence, including the body and the mind. The basic elements of Earth, Fire and Water were considered as being constituted of fundamental particles in constant motion, interaction, combination and transformation, which meant constant creation and dissolution. One may see that the Earth

principle here could represent the totality of atomic elements recognized by modern chemistry. The Fire principle would represent all forms of energy that drive all physical and chemical transformations; and Water would represent the fluid medium enabling the flow, pervasive reach and interaction of all matter. Vaisesika postulates three principles, Dravya, Guna and Karma, corresponding to Substance, Property and Action, which can be taken to represent the entirety of the human body and its processes. There is a further principle that in combination, like substances become stronger while unlike substances become weaker. From this comes the therapeutic principle that the equilibrium of components that characterizes good health, can be restored by offsetting their comparative strengths and weaknesses. Ayurveda clearly draws from all these concepts of Vaisesika.

Of the other philosophical systems, Mimamsa addressed issues arising out of the rites and rituals addressed by the Vedas, while Vedanta, representing the ultimate message of the Vedas, addressed the question of the ultimate Reality. Even so, Ayurveda has drawn from some of the concepts of these two systems, like the action of Karma or a never-ending cycle of successive Cause and Effect, operating through successive lifetimes and also acceptance of the idea of a Creator as the Original Cause. Ayurveda thus attributed incurable diseases to a carry over of influences from a past lifetime and prescribed special prayers and procedures to invoke divine intervention as the only possible therapy. Efficacy of such solutions were taken quite seriously and not taken as an easy way out of intractable medical situations, especially those of a psychosomatic character. This was reflected in the remedies of the Mantra, Mantra and Tantra which carried clear scriptural support and to which Ayurveda maintained strong allegiance, and which therefore commanded great popular faith

Finally it was left to Sankhya and Yoga to address the questions of physical existence at both Cosmic and Individual levels, and thus provide the more direct philosophical roots of Ayurveda. It is from Sankhya and Yoga that Ayurveda draws most heavily and directly. While Sankhya addresses existence in a larger Cosmic context, Yoga has its focus more on the Individual, though both stress the point that the latter context is an integral part of the former, and therefore both need to be addressed in a joint holistic way.

The most fascinating aspect of a study of Ayurveda is the way it fits every detail of structure and function of every part of the human body as a microcosm that is modeled in an identical way and connected to every part of the cosmic macrocosm, as one single vast seamless, holistic continuum. The material components and the non-material influences determining behaviour at both these micro and macro levels are traced back to their very origin from the two eternal principles of Purusha or Consciousness and Prakruti or Nature, as postulated by the Sankhya philosophy. The combination of

Purusha and Prakruti leads to all creation and their separation to its dissolution. What is remarkable is that this concept of a seamless continuum obtains across this vast matrix of basic materials and influences, evolving in stages from subtle to gross forms and states. One can readily recognize analogues of these ancient concepts presented in modern science such as in the example of Energy, now seen as a single fundamental entity differentiated over a vast spectrum of frequency bands, identifiable as heat, light, electro-magnetism and other forms with different properties. Particle Physics tells us that there is no dividing line between Matter and Energy, Einstein has reduced their equivalence to a mathematical equation. And Astrophysics tells us how energy is seen to shift into the state of physical matter and take the form of the stars and the other vast forms of matter that comprise all that we know as existence.

Sankhya holds that all that is created physically within the framework of Prakruti is subject to its three basic properties, the three Gunas, viz. Sattva, Rajas and Tamas. These three properties have a generic character manifesting in specific forms affecting different facets of all that exists, whether at the cosmic or individual levels. At a material level these properties respectively contribute equilibrium, dynamic change and passive inertia. At a functional level of the individual, Sattva contributes knowledge, tranquility or happiness, Rajas contributes activity that generates both pleasure and pain, while Tamas causes Ignorance and inertia. The three Gunas, being non-material influences, have their effect mainly at the mental and emotional level, At the physical level of the body, the three Gunas have material analogues in the three Doshas, which are the determinants of health or ill-health. The therapeutic approach of Ayurveda aims at establishing the primacy of Sattva in the mind and equilibrium of the three Doshas in the body, to ensure good health and longevity, which are then emphasized as essential to take the individual into the higher levels and purposes of existence. Rajas and Tamas in the mind are considered to be the Dosha analogues that contribute to mental ill-health.

The Atharva Veda, draws on the accumulated knowledge of all these earlier traditions. In their study of human experience, the Indian ancients stressed the need to draw on the observations and experiences of tribes and forest dwellers and from the behaviour of animals, of how they handled illness and injury. A remarkable reliance on intuition and survival instinct was to be seen among them, without the benefit of informed reason of any kind. That their remedies proved effective in many cases is not in doubt. But in the case of man, his reliance on instinct and intuition also extended beyond proven medicinal remedies, to a wider range of practices like incantations, charms, spells, amulets, curses, spirits and ghosts. Today while all these last mentioned practices are considered irrational, we still find them accepted by even educated people. More importantly, we are beginning to see whether there is some substance in these practices within a

psycho-somatic framework. The Mantra is being increasingly prescribed and used in meditation practices to leverage the role of the mind as a powerful influence on the body, in the newly emerging discipline of Mind-Body medicine.

We surely cannot even today claim to know everything about the human mind or all human faculties, which now and then, throw up inexplicable surprises. The operations of the sixth sense or para-psychology still remains an open question mark. It may well be that the approach and methods of investigation of modern science are still not adequate or appropriate for identifying unknown causes of many known effects seen in many areas of human experience. We can't explain even the ubiquitous phenomenon of love at first sight ! Our scientific conditioning prompts us ask whether the faculty of sight uses some unknown medium or special frequency that is in operation here ! One wonders therefore whether there is a spell or a charm at work here ! Should we here then say, "where there is (not a will) a charm (or just charm !), there is a way " ?

Herbs, spells and charms and beyond that, of ghosts and goblins, is what we frequently encounter in most ancient or primitive traditions, and persisting to the present day throughout Asia, Africa and among the Red Indians of North and South America. In India however, they find a place in a Veda which also presents high levels of thought, logic and reason. Articulated here by Rishis of impeccable credentials of integrity and knowledge, they do seem to merit a closer unbiased look with an open mind. When an bodily ill-effect is attributed to a inimical external cause, the individual naturally seeks the help of someone knowledgeable in such matters. The cause may be a known disease with a known remedy, but it may as well be due to an unknown force or activity. The unknown cause may be labeled as a spirit or a ghost and a charm or a amulet or a mantra is offered as a remedy. Common or widespread usage then confers on these the status of a remedy. Such unknown causes and related remedies now have modern names like allergies, syndromes, etc, which give them the appearance of Knowledge, but basically, persistent and widespread experience tend to make them become part of a prevailing medical tradition.

The efficacy of many of the ancient remedies may well have been a placebo effect, which is now recognized and well documented. But what is behind the placebo itself, we are beginning to see a role of the mind, but we still simply do not know. If a remedy has an effect, the practice becomes established. If the remedies have no effect, the system and those supporting it get discredited. But then we also have the story of the astrologer who assures the client that he will live long. As long as he lives, the client goes on giving credit to the astrologer. If he dies prematurely, he is no longer there to discredit the astrologer and more often than not, the belief lives on ! Every profession has its share of respected and discredited practices and practitioners. This was true of Vedic times as well and the early bias against the Atharva Veda was

not a little related to its association with the subject of medical practices which presented a seamy side. But there is also a larger danger here calling for caution. We may end up discrediting persons or practices wherever we do not know or understand them - a danger that does certainly pervade all cultures and has, through the centuries, sacrificed some great thinkers whom those in authority could not understand and therefore could not tolerate.

But what has all this to do with the ultimate concern of Ayurveda, or the Atharva Veda from which it draws its sustenance and substance ? Firstly, that a sound and healthy body alone will guarantee a healthy Mind and conversely, a healthy Mind ensures a sound and healthy body. More importantly, it enables the Mind to go beyond the horizons of a Physical Existence and get to see the vast perspectives of a Spiritual Existence where the true or larger purpose of Existence is to be found. The Atharva Veda begins with addressing the health related problems of Physical Existence, but nevertheless ends its own prescriptions in its own Upanishads that lead on to the perspectives of the ultimate Spiritual Existence.

N.Krishnaswamy

CHENNAI : 01-12-2012

CHAPTER 1 : INTRODUCTION



अहं हि धन्वन्तरिरादिदेवो जरारुजामृत्युरोऽमराणाम् ।
शल्यङ्गैरपरैरुपेतं प्राप्नोऽस्मि गाम् भूय इहोपदेष्टुम् ॥
aham hi dhanvantarirādidēvō
jarārujāmṛtyurō'marāṇām
śālyāṅgairaparairupētamprāptō'smi
gām bhūya ihōpadēṣṭum

I am Dhanvantari, the primal god who eliminated senility, disease and death among the gods, born again on earth to expound surgery and allied branches of knowledge.

--- Divodasa, his teacher, quoted by Susruta
in the Susruta Samhita ---

The Highest Divine as the Ultimate State of all Existence is represented by the name Sat – Cit – Ananda, standing for three states of Truth, Consciousness and Bliss. At the level of human existence Bliss represents a state of freedom from pain and sorrow; Truth is an understanding of why these arise in human experience; and Consciousness enables such understanding. Ayurveda is the knowledge that enables human existence to attain to these high states.

The word Ayurveda means the Knowledge of Life. While it deals with longevity and good health through effective prevention and cure of disease, it goes well beyond the concerns of modern medicine in this regard. It looks, not only at external interventions serving these objectives, but at all the available internal resources of the body and the mind themselves to serve these very objectives. And more importantly, it seeks to help the Mind to look further, far beyond the horizons of physical existence, into the vast perspective of spiritual existence, where alone, the true meaning and purpose

of existence is to be discovered. Such a perspective gives to the Mind an extraordinary vitality and stability that, in turn, as already pointed out, contributes to the vitality and stability of the physical body. Ayurveda, in partnership with Yoga, gives centrality to the role of the Mind in assuring good health.

An understanding of Ayurveda at a fundamental level requires an understanding of the Vedas from which it draws philosophical sustenance and practical method. The final finding of the Vedas is that the individual, is aware of his own dual identity at two levels : a higher identity which is Spiritual, the true "I" which is possessed of the faculty of Consciousness; and a lower identity which is Physical, the pseudo "I" that identifies with the physical body and its external physical world, and which is possessed of the faculty of Intelligence. Both identities reside in his Mind, the higher keeps the individual on the path of a higher spiritual destiny, while the lower enables him to cope with the problems of physical existence.

It is a well known and accepted principle, that when one entity generates another, the characteristics of the former are inherited by the latter. The Vedas stressed that the human as an endpoint in a chain of creation originating in the Highest Divine must therefore have an inheritance of that divinity. This divinity could be in a large measure in saintly persons, and at least as a spark in everyone else. The idea of an Avatar or an Incarnation reflects this principle. But the point that is now urged here is that Intelligence resident in an earlier creation is inherited by everything that is created later in this chain, and indeed, pervades everything that exists. Intelligence is here to be understood, not in the narrow conventional sense of the human faculty, but to that larger principle that controls the predictable behaviour of all matter, organic and inorganic, sentient or insentient.

It must be further clarified here, as will be elaborated in this book, that Intelligence is not a faculty that is limited to the human mind but is a generic faculty that guides energy to take different forms of matter and pervades all forms of matter comprising the entire physical body, and indeed, the entirety of physical Universe. Modern Science has today virtually accepted that all matter is one fundamental Energy that manifests in a myriad of forms and states. Interestingly these conclusions derive from two modern Sciences addressing the relationship of Energy and Matter at two different levels. Particle Physics looks at events at the Micro sub-atomic level, and Astrophysics looking at events at the Macro level of the Cosmos. At the first level we have high energy levels splitting the atom into a vast array of sub-atomic particles of matter that come into momentary, transient existence, perhaps dissipating and disappearing in the form of energy. At the second level we have new stars come into existence with very high pressures and temperatures converting massive aggregations of energy into matter in a variety of atomic identities. The chemical composition of old and new stars are seen to present a variety

that gives us some idea of how our own earth must have been formed at the dawn of its creation.

It is energy that keeps electrons, protons and neutrons together as an atom with their different aggregations in space in the solid, liquid or gaseous state. It is energy that brings atoms of different substances together to form molecules of different substances with different properties that determine their behaviour. Electrical energy originates in chemical action between the electrodes with an electrolyte inside a battery, resulting in movement of ions between the electrodes through the electrolyte and as electrons through the wire connecting the electrodes outside the battery. The process is reversed when the battery is being recharged. Again, when the electrons move in a wire as electricity, they generate a magnetic field around the wire that can drive a motor. The process is reversed in a generator. Thus the electron is clearly is a vehicle of energy that can induce a variety of activities. But what is it that makes the electron, whether here in the atom or there in the cosmos, behave in a consistent and predictable way ? The word Intelligence or Awareness at once comes to mind. Are we then seeing Energy possessed of Intelligence or Intelligence possessed of Energy, or fundamentally, that both are One ?. It is this uncompromising logic that drove the ancient Rishis to the conclusion of a single Ultimate Entity, a Consciousness that manifested and proliferated through Intelligence and Energy into the multiplicities of all Existence .

If matter in every state is considered to be derived from Energy, one might venture to suggest that all its properties are derived from its Intelligence. Such an understanding would then be seen to have a direct relevance to the structure and functions of the human body and every atom and molecule constituting it. While electrical energy may basically originate in the electron within the atom, it is to be noted that chemical properties attach to the electrons of the multiplicity of atoms that constitute the molecule. We see energy provided in the body by sugar which is basically a molecule made of atoms of Carbon, Hydrogen and Oxygen. The DNA is a more complex molecule resident in every cell of the body and determines the structure and function of every organ of the body and ultimately holds the very spark of life itself. The body thus turns out to be a vast chemical factory resting on the chemistry of molecular biology. While the Energy component aggregates into the myriad forms of matter constituting the body, the Intelligence component aggregates, if one might put it that way, into properties and functions in a variety of forms. Ayurveda envisages the emergence in this way of the energy and intelligence of every molecule aggregating ultimately in every component of the body including what are called the Doshas, and then how these forms and functions underwrite good health and long life.

One can now readily see the central role of the Mind and the faculty of Intelligence that uses the energy resources of the body that sustains the activities of the body

and guides the individual's interaction with the world of which he is an inseparable physical part for the duration of his lifetime. In the context of the functioning of the human body, Intelligence is therefore to be seen as resident not only in the brain, but in every cell of the body, that makes every organ function reliably and predictably. Chemical processes as we have seen earlier, generates electrical impulses. We thus have chemical and electrical messages providing the basis for instantaneous sharing of Intelligence across every organ, indeed every cell of the body. Here is how the brain responds instantaneously with pain and a repair process to an injury in any part of the body. The Mind – Body complex works like an electronic messaging network, and invests the Mind with a phenomenal power to monitor a body-wide system of problem health events and therapeutic processes. It is how well these processes occur, that results good health or ill-health. It is this perspective of these ancient disciplines that has exerted an enormous influence on modern medicine, and led to the emergence of the new burgeoning discipline of Mind-Body Medicine.

Health, disease and longevity of the human body are determined by processes at two levels, one, the totality of the external environment with which we interact, and the other, the totality of the responses of our Internal systems. The food that we eat and the air that we breathe, are critical material inputs that come from our environment. But equally critical are the non-material sensory inputs that come from the environment through the Jnanendriyas, the five senses of touch, taste, smell, sound and sight, that give us knowledge of the environment. Ayurveda considers the contacts of these senses as impacts with healthy or unhealthy effects. Even an image coming in through as a visual contact could trigger an evil thought and could be as harmful as infection through direct physical contact. Any harmful sensory input thus can trigger a harmful internal or external response.

Harmful responses from us, impacting on the external environment, arise from two of our five organs of action, the Karmendriyas. They are the two responses of speech, and physical action. Internal responses also arise from the remaining three Karmendriyas of Assimilation (of food) Elimination (of bodily waste) and Reproduction (the powerful drive of sex). And finally we have the Mind monitoring and coordinating not only the entirety of input and output activities of the body, but monitoring the entirety of the internal organs of every part of the body. For the Mind, the inner and outer worlds are virtually one single continuum and it is in a unique position to modulate the entirety of the internal functions of the body and preserve its health or suffer it to simply succumb to disease and death. This is the perspective of Ayurveda.

The main downstream evolutes of the very first Purusha – Prakruti origins of existence, as formulated by the Sankhya, at the level of the individual, start with the faculty of the Buddhi or Intellect, that interprets and takes decisions on

whatever is brought to it by the Ahankara or Ego from the Mind, and from the Sensory complex. The sensory complex is comprised of the five Tanmatras, or transit media for Sight, Smell, Touch, Hearing and Taste, and their evolutes, the five Jnanendriyas or sensory organs, and the five Karmendriyas or organs of action, viz, speech, locomotion, manual activity, evacuation and reproduction. Sankhya then posits the principle of Parinamavada, or Law of Transformation, that holds that due to the action of the three Gunas, Prakruti is in a state of constant flux, marked by constant creation and destruction that occurs both within the body and the external world. This is one of the basic principles underlying the understanding of Ayurveda. What is interesting is that this at once calls to attention the findings of modern medicine that there is a constant creation and destruction of the cells constituting the body. As Deepak Chopra points out, 98 percent of the atoms of the body today were not there a month ago. If I am not the person I was a month ago, then the question "Who am I?" This is not just a philosophical question, but becomes a hard practical question. Rebirth, it would appear, is not something occurring across lifetimes, but all the time within a lifetime. It is driven by an unending chain action of cause and effect which is what is termed Karma. It is interesting the literal meaning of the word Karma is Action, which obviously encompasses Reaction!

Against the above background, it will be useful to visualize how exactly, man, the microcosm, relates to his environment, the macrocosm. Sankhya gives an interesting concept of Dravya, Guna and Karma, a triad of Substance, Property and Action that vividly represents and accounts for the behaviour of all that exists, whether at the individual or the cosmic levels. The Pancha Mahabhuta, or Five Great Elements, Fire, Earth, Water, Air and Ether or Space, represent the Dravya, the Substance component. These may be envisaged respectively as generic representations of Energy, and Matter in the solid, liquid and gaseous states, all subsisting within Space. More specifically, the most pervasive elements of Matter are Hydrogen and Oxygen, together making Water, along with Nitrogen and Carbon. In combination these elements constitute the bulk of all organic matter of both human and plant life. All these pervade the entirety of the Ether or Space, all the way from the innermost recesses of the body of the individual to the outermost reaches of the Cosmos. Fire is the great Energy principle that creates and dissolves all forms of matter all the way from the cell in the body to the star in the sky. Water is the generic Fluid principle, the liquid state that enables the mixing and interaction of all elements to create and nourish or support all sentient and insentient forms of existence. Air provides the Pressure principle that propels all movement of all elements and components across Ether or Space, whether within the body or outside it in the Cosmos. Surely the same elements pervading and interacting all the time across all of Space, within and outside of ourselves, points to all of existence to constitute one large integrated continuum where our claim to individual,

separate, unique and independent existence must be seen to be unreal if not absurd.

We may now note that all these processes involving the Pancha Mahabhutas are moderated by the three great influences, the three Gunas. In generic terms, the Sattva Guna maintains their equilibrium, the Rajas provides the dynamism that drives their growth and change, while the Tamas provides the Inertia that maintains their forms in a static state. In more specific terms at the level of the individual, the Gunas provide the motivation that colours different activities of the body. In the mind they provide the intent behind every action, physical, mental, emotional or even spiritual. Each action then initiates a reaction which then continues into the long cause-effect chain called Karma. The word Karma refers equally to an individual action and the consequent cause-effect chain. The critical point here is that the cause-effect chain is beneficial or harmful as much to oneself as to others or to the environment, according to whether the motive of the initial act was selfless or selfish. The benefit or the harm could be in mental terms within the mind itself or may extend in physical terms into the body. Guna effects within the mind translate into physical impacts on the balance of the three Doshas within the body, which in turn, determines the state of health or ill-health.

This brings us to the main concepts of Ayurveda. It would be appropriate at this point, to begin with a brief consideration of the three Doshas, Vata, Pitta and Kapha, the great energy principles that drive all events in the body. In generic terms, Vata handles propulsion, Pitta handles transformation and Kapha is what supports cohesion. In the body, Vata is the Air principle that drives respiration, the heartbeat, circulation and evacuation, while in the mind, it drives motivation. Pitta is the Fire or heat principle that transforms food into tissue and other constituents of the body, together with waste by-products that need to be eliminated. In the mind, Pitta supports perception. Kapha is the Water principle that is the largest constituent of the body and gives cohesion to every part of it. In the mind, Kapha supports cohesion at the emotional level.

All food when digested results in the formation of the Dhatus or tissues, the Malas or waste materials, and the Doshas that have an important functional role of moderating every function of every organ of the body. The Dhatus are seven in number : the Rasa Dhatu or Plasma; the Rakta Dhatu or Blood; the Mamsa Dhatu or Muscle; the Medha Dhatu or Fat; the Asthi Dhatu or Bones; the Majja Dhatu or Marrow and Nerves; and the Sukra Dhatu or the Reproductive tissue. The Dhatus are what provide life support and strength to the body.

While the Malas or waste materials are eliminated through sweat, urine, faeces etc, the Doshas, though similar to the Malas, are retained in different parts of the body, where they perform their moderating function referred to earlier. The Doshas are produced not only at the stage of digestion, but also

as by-products at the stage of dissolution of the Rakta Dhatu and the Rasa Dhatu. The Doshas contribute to health when in equilibrium and to ill-health when in a state of imbalance.

Illustrating the great depth of further detail addressed by Ayurveda, each of the three Doshas has five sub-types. Each sub-type has specialized properties and functions. Thus for instance, the five sub-types of Vata are called Vayus and bear the names Prana, Udana, Vyana, Samana and Apana. Of these, Prana and Udana respectively propel all the body's Input and Output, and all downward and upward movement, within the upper part of body. Input is the breathing intake of air or the eating intake of food into the body, while within the mind, the Input is represented by the formation of Impressions from all the inputs coming from the senses. The Output is the exhalation or speech from the body, while in the mind, it would represent the generation of perceptions that trigger onward actions. Vyana and Samana are respectively the outward centrifugal and inward centripetal propulsive forces within the body. Vyana for example, drives the heartbeat and blood circulation. Finally Apana is responsible for all downward movement in the lower part of the body, including the expulsion of urine, faeces, semen, menstrual fluid and the downward push of the foetus during child-birth. These actions have a periodicity that support many other bodily functions and also have a bearing on the immune system.

Like the Vata, Pitta has five subtypes called the Pachaka, Ranjaka, Alochaka, Sadhaka and Bhajraka, while Kapha has five sub-types called the Avalanka, Keedaka, Bodhata, Sleshaka and Tarpaka, all supporting a vast range of functions in different systems or parts of the body. Of special interest, beyond the three Doshas are the subtle master forms of which the Doshas are gross derivatives. Vata is derived from Prana, Pitta from Tejas and Kapha from Ojas, and these three master forms are considered the source of the positive health giving properties of the Doshas. One can see at once how the Prana-Tejas-Ojas triad, and their derivatives, the Vata-Pita-Kapha triad and the latter's 15 sub-types lead to a vast range of differentiation through combination, so as to make the individual completely unique in his physical and psychological constitution. For Ayurveda thus, each individual has to be considered to bear a unique constitution that is the final determinant of all diagnosis and therapy.

A skeletal framework of bones give the body its final shape and support. The Atharva Veda presents a total bone count of 360 in the body, affirmed with some small variations by later Ayurvedic texts, arising from whether the teeth and some hard tissues are to be so counted or not. Later counts come closet to figures of medical texts of today. A few more points need to be now considered to get a fuller internal picture of the body from the Ayurvedic perspective. The body is seen in terms of the broad functional systems comprising the body and the network of channels called the Srotas that service them with nutrition, or drain away their waste products, or enable

communication between them. Here then is the vast communication network which enables instant awareness in every part of the body of what is happening in every other part of it, like hunger, thirst, pain and pleasure.

There are fourteen Srota systems with corresponding functional systems : The Pranavaha Srotas : carrying the life force to the respiratory system; the Ambuvaha Srotas regulating the entire water metabolism; the Annavaha Srotas bearing food and serving the digestive system; the Rasavaha, Raktvaha, Mamsavaha, Medhovaha, Asthivaha, Majjavaha and the Sukravaha Srotas servicing the corresponding seven Dhatu or tissue systems; the Artavaha Srotas serving the menstruation system in women; the Stanyavaha Srotas serving the breasts in women; the Mutravaha Srotas serving the urinary system; the Purishavaha Srotas serving the excretion of the faeces; the Svedavaha Srota serving perspiration by the sebaceous system; and the Manovaha Srotas that serve the mental system. The flow in these different Srotas determine the health of the systems they serve, and abnormal flows lead to different disease conditions and provide the symptomatic basis on which both diagnosis and therapy are determined.

And finally the body is said to be possessed of a large number of Vital points called Marmas, similar to, and possibly the source of the sensitive points of the Chinese Acupuncture system. These are junctions of critical entities like nerves, blood vessels, bones, tissues and joints. Damage of any kind to these Marmas could result in serious consequences, that could be life-threatening. It is of considerable interest that all the features of Anatomy and Physiology described above were derived from practices of dissection which find reference in all the ancient Ayurvedic texts.

Ayurveda, right from the ancient days of its emergence as a full-fledged science of medicine has always been presented at two levels. The first is a basic level of reason based on simple principles readily recognizable in common experience and commonsense of the common man, the patient. At the second level, as a Science, it encompasses a vast range of technical details on diseases, medicines and medical interventions and practices. This book, intended as it is for the First Time Reader, has its main focus appropriately on the first level, while making occasional and brief references to a few technical details only as pointers to the vast depths beyond that focus.

The evolution of Ayurveda in a broad perspective of time, is here reviewed in three broad time sequences : Pre-Vedic / Vedic, Post-Vedic and Modern. After the great updating by Vagbhata in the 6th Century AD, the core of Ayurvedic theory and practice has largely remained static until the present day. The political upheavals of subsequent centuries, especially the spread of Moghul rule and finally of British rule with the import of Western medicine marginalized the importance of Ayurveda. Its influence survived largely because people had no

alternative reaching into the vast areas of the countryside. Luckily after India became independent, Ayurveda has gained official recognition with governmental support for Institutions for Education, Research. and institutional and personal medical services devoted to Ayurveda. However Western medicine has become more pervasive, reaching today deep into the country, limiting the reach of Ayurveda, Thankfully however, Ayurveda has currently gained a new life, thanks to its widespread popular acceptance in the West, and indeed, recognition by the Western medical community itself ! This simply is a vindication of the fact that Ayurveda is rooted in the wisdom of the Vedas.

We may therefore appropriately open this presentation of the Ayurveda with the next Chapter on the Atharva Veda from which Ayurveda drew both its knowledge and authority. We shall follow this up with an account of Charaka and the galaxy of ancient scholars who invested Ayurveda with its character as the world's first medical system and as a mature, full-fledged scientific discipline. We shall touch briefly on other ancient medical traditions, ending with the evolution of modern Western medicine from its own ancient roots. We can finally conclude with how Ayurveda and other ancient medical traditions are interacting with the modern medicine, and how indeed, East is meeting West, where we are seeing the emergence of a large synergy of medical knowledge for benefit of mankind.

CHAPTER – 2 : THE ATHARVA VEDA

एतत् सर्वं ब्रह्मेत् ब्रह्म अयमात्मा ब्रह्म, सौऽयमात्मा चतुष्पात्

Verily everything is Brahman. The self within is Brahman.
The self has four aspects

The Mahavakya of the Mandukya Upanishad
of the Atharva Veda

The Atharva Veda takes its name from the Rishi Atharvan. Later the word Atharvan acquired a generic status, as representing the priest at rituals serving people with medical problems, and even to refer to plants with therapeutic value. This Veda is considered to have been composed by two groups of Rishis, the Atharvana and Angirasa groups. Other contributors included the Rishis Kausika, Vasishtha and Kasyapa. One text listed ten Shakas or schools that got established for the propagation of this Veda, of which two survive today, known as Saunakiya and Paippalada. The Atharva is dated to the same time as the other three Vedas towards the end of the 2nd Millennium BCE, though some place the Vedas far earlier. The surviving text of this Veda has been estimated by W.D. Whitney - to consist of around 5038 verses (Rcas), under 598 hymns (Sukthas), grouped in 20 books (Kandas). Of these, the 19th and 20th books are considered to be later additions.

The extensive references to the afflictions of the physical body and their remedies, led the Atharva Veda to be regarded as standing apart from the other Vedas, which addressed larger spiritual concerns. The Atharva's attributing disease to spirits, goblins and other mysterious forces, and prescribing charms, amulets, incantations and other practices as remedies would suggest its originating as a stock-taking of the primitive traditions of the pre-Vedic times. One might recognize in this Veda, a gradual adapting of these old traditions to newer ones by the Vedic Rishis in two stages. The first stage is attributable to the Rishi Atharvan, with associating ritual text and format with the older practices, The second stage is attributable to the Rishi Kaushika with the introduction of information on herbs and other materials that had therapeutic value, which provided the roots of the formal Ayurveda of later times. Retention of much of the primitive practices was perhaps in order to retain the existing widespread acceptance by people largely steeped in the ancient superstitions, beliefs and practices. Clearly the amulet and incantation had an immense, and widespread appeal for primitive people much as the Vedic Yantra, Mantra and Tantra had at a later age. With more formal Vedic accretions including finally, the Mundaka, Mandukya and Prasna Upanishads, the Atharva would have finally acquired the form and status of a full Veda. This progression may be seen in the

initial seeming exclusion of the Atharva from the Veda corpus, reflected in the word "Trayi" or Trinity, used for the Vedas, as if they referred to the Rig, Yajur and Sama Vedas alone. Hymn 11.6.14 of the Atharva Veda refers to itself as Bhesaja, (a word meaning the art of healing and used as a synonym for the Atharva), and as speaking in the formats of poetry, prose and music respectively of the Rig, Yajur and Sama Vedas. Later scriptural references set this matter at rest with a specific affirmation of an equal place for the Atharva alongside the other three Vedas. It was an affirmation, as it were, of a concern, not only for the reality of the highest Divine, but also for sensitivity to the more stark reality of human suffering.

The Atharva Veda talks of the instinctive use of medicinal plants used by a whole range of animals -- cows, oxen, sheep, goats, eagles, serpents, porcupines etc. (AV VIII 7-23-26). It refers to the existence for service to the people of those times, of "hundreds of physicians and thousands of medicinal plants" (AV II-9-3) And like the other Vedas, the Atharva too refers to the medical skills of Gods like Brahma, Indra, Surya, the Asvins and cites some remarkable cures and even surgeries performed by them. This could be, at least, an indication of a considerable awareness or prevalence of medical knowledge and practice at a human level at that time. In respect of physicians at the human level, there are more explicit references to several Rishis : Atharvan, Saunaka, Bhrgu, Angira, Agastya, Kasyapa, and Kanva, to name but a few. The medical references in the Atharva Veda can thus be seen to reflect an ancient pre-existing body of traditional knowledge prevailing in the society of pre-Vedic times, where from the earliest stages of his existence, man must have been concerned with the need to deal with illness or injury that threatened his survival. It is clear his knowledge in this regard came as much from his instincts as from his observations of his environment. The works of Charaka and Sushruta, while acknowledging the debt of Ayurveda to the Atharva Veda, made it clear that the roots of that Veda itself lay in the older tradition of the pre-Vedic society that was largely nomadic, tribal and later pastoral.

A considerable content of references to longevity, to diseases and their prevention and cure, and to medicinal herbs, preparations and procedures, clearly set the basis in the Atharva Veda from which the Science of Ayurveda derived its authority and developed in due course, into a full fledged discipline in its own right. Ayurveda did indeed develop a status and authority to the point of being treated as an Upanga or Accessory of the Atharva Veda, later being regarded as a Vedanga or a Limb of the Vedas, and later even worthy of being considered as a full, fifth Veda.

One verse (X-8-4) of the Atharva Veda refers to a wheel with 12 felloes, three naves and 360 fixed pins. This is clearly a metaphor, standing for the wheel of Time, representing the year with three seasons, 12 months and 360 days. A second interpretation is that it represents the body, its three parts (head, trunk and limbs), twelve organs, and 360 bones. (300 major and 60 minor). Of course, the Vedas abound in metaphors of this kind that admit of multiple interpretations. The latter interpretation is favoured as reflecting the Atharva's preoccupation with the human body. The count of 360 bones is affirmed later by Charaka, but with Susruta opting for a lower figure of 300. The latter figure could claim more accuracy as it was set by Susruta, reflecting his surgical perspective. In Hymn II-33, the Atharva Veda lists and names 49 principal organs of the body. Hymn I-7-3 talks of 1000 Hiras and 100 Damanis with other hymns offering other figures. Hiras are interpreted to refer to nerves and Damanis to blood vessels. The most substantial components that constitute the body are the Dhatus, seven in number, and bearing the names Rasa (chyle, the basic nutritive essence emerging from digestion of food), Rakta (blood), Mamsa (flesh), Medas (fat) Asthi (bones), Majja (marrow) and Sukra (semen). All these are listed in Hymn IV-12-2,3,4,5 which also describes the plant Rohini as having a healing effect on all these components. Hymn X-12-17 refers to the role of Sukra as critical, as it says that if this is exhausted, all the other Dhatus will simply waste away. And Hymn I-12-1 refers to Ojas likewise as the subtle higher quintessence of all the seven Dhatus. Hymn X-2-11 refers to the pervasive spread of various fluids along srotas or channels from various organs to every part of the body to sustain every bodily organ and function.

A great part of the Atharva Veda is addressed to nearly 100 major and minor diseases, which are classified in Verses 1 to 21 of Hymn IX-8 as those affecting the head, general diseases, heart and abdomen, back and rectum, blood, limbs and bones. And spread over the book are around 100 named medicinal plants, many identified and used today as remedies for many of these diseases. The pervasive symptom of fever, under the name Takman, characterizing several disease conditions, many of them treated by a versatile plant called Kushta, akin to Soma, find extensive coverage. Beyond these physical remedies, of course, are a wide range of incantations and amulets offered as remedies for diseases, in the Atharva Veda. These diseases are generally psychological in character, attributable to ghosts, goblins, spirits and mysterious inimical forces. The therapeutic approach here appears to rest on a simple rationale of a psychological remedy for a psychological affliction, an approach which, of course, prevails even today with common people, and perhaps in modern medical practice in the garb of placebos. These remedies are often used as supplements to the prescription of regular medicines. The incantation

in the format of a mantra gives these practices the stamp of Vedic authority and could have provided the basis for absorption of the ancient beliefs and practices and transformation into the Atharva Veda. The Vedic Rishis clearly had a considerable knowledge of not only human anatomy and physiology but also human psychology.

It must be noted that the great preoccupation of the Atharva Veda with gods, spirits, ghosts, goblins and other super-natural entities as causes and with incantations, mantras, charms and amulets as remedies in respect of human disease or difficulty, is by no means unique to the ancient Indian tradition. All these can be seen to be prominent in practically every culture and tradition of the world and to be as much prevalent today among modern people as it was with ancient people in olden times. Writers who decry traditions of Hinduism and Buddhism would do well to take note of the extensive presence of these features to this day in the practices and beliefs of Christianity, Judaism and Islam or the native peoples of Africa and America who still remain untouched by the major religions. Exorcism has acquired a recognized place in the modern Catholic establishment, with a Catholic University in Rome reported to be offering courses on Exorcism to students from around the world. The Church of England is reported to have priests in every diocese trained in exorcism and psychiatry. Islam refers to the role of the Jinn and the Shaitan, and Judaism refers to spirits called Dybbuks, which include good and bad ones.

Atharva Hymn I-3-1 presents an specific example of an incantation accompanying a surgical intervention in a specific physical problem, The hymn reads “We know the reed’s father, Parjanya of hundredfold virility; with that will I make weal for thy body; on the earth, be thine outpouring, out of thee with a splash”. Here, the reed is said to grow well in the rainy season, hence appropriately, Parjanya, the god of rain, is invoked by the priest-surgeon, while using a reed (like today’s catheter) on the patient, to clear his blockage of urine. That the urine would pour out on the earth with a splash, is surely a bit of poetic and vivid imagery here ! Of course, the invocations against ghosts and goblins and how charms and amulets work against them are less obvious, but the range and type of problems that are addressed are often as interesting as they are fantastic. They are invoked for instance, to help victims of snake bite, scorpion stings, or poisoning by enemies, or persons suffering from fits or insanity, attributable to spirits, or assure success in love and war, defeat the evil designs and tactics of enemies, and even counter the designs of the other woman trying to seduce one’s spouse. The power of the incantation is said to reside in the amulet and protect the one wearing it. The Atharva is replete with charms with hymns explicitly providing them as solutions for a wide range of problems.

In all this one can see an instinctive understanding of the role of the mind, what we might understand today as psychology. In dealing with the Mind and the nervous system, several hymns make a clear distinction between Mamas (the will), Kratu (Intention), Sankalpa (Thought) and Manyu (Decision). Head and heart were considered connected, and the heart was considered the seat of Consciousness. The senses, apparently including the mind and consciousness, were counted as seven in number.

The Atharva Veda in the Paippalada recension presents every stage of human procreation, from conception, through pregnancy to delivery in considerable detail. Conception is considered a sacred event attended by the gods, and therefore to be protected by prescription of special incantations and amulets. Hymn V – 25-10,11, and 12 describes the descent of the ova through the two Gavini ducts (the Fallopian tubes) into the uterus. Hymn VI-121-4 describes the actual delivery. Miscarriage is a known event and Hymn II-25-3 invokes a special plant called Prsniparni, to ward off the Kanva demons which are said to cause miscarriage. The Veda then goes on to dealing with diseases special to children and women and then on to general problems of adults including those of virility, rejuvenation and old age, and including those arising from not only disease, but also injury and poisoning.

Reference has been made earlier to the digestive processes leading to the Dhatus or basic components of which the body is constituted and also a class of products called the malas, which are all eliminated from the system. The role of the three Doshas, which pervade the body and how have a direct impact on the health of the body when not in a state of balance, becomes more explicit in the later Ayurvedic texts than in the Atharva Veda.

The vast reference to various features of the body enumerated above, largely clothed as processes of supernatural causes and remedies of its afflictions make the Atharva Veda the base from which the more rational and practical presentations of later Ayurveda was able to evolve into a more scientific discipline. This indeed, is in keeping with the broader trend of the evolution of the Vedangas from the Vedas. The first major work to emerge from this evolutionary movement from the Atharva Veda was what became the Charaka Samhita, to which we now turn our attention in the next Chapter.

CHAPTER – 3 : CHARAKA



Statue representation of Charaka at the Patanjali Yogpeeth, Haridwar, Uttarkhand.

सोऽयमायुर्वेदः शाश्वतो निदिश्यतेऽनादित्वात्
स्वभावसंसिद्धलक्षणत्वात् भावस्वभावनित्यवाच्च ।
न हि नाभूत् कदाचित् आयुषः सन्तानो बुद्धिसन्तानो वा
शाश्वतश्चायुषो वेदिता अनादि च सुखदुःख
सद्द्रव्यहेतुलक्षण मपरापरयोगात् ।।
śō'yamāyurvēda: śāśvatō nidiścyatē' nādityāt
svabhāvasamsiddhalakṣaṇatvāt bhāvasvabhāvanityavācca
na hi nābhūt kadācit āyuṣa: santānō buddhisantānō
śāśvataścacāyuṣō vēditā anādi ca sukhadu:kha
saddravyahētulakṣaṇa maparāparayōgāt ..

-- From the Charaka Samhita --

Free translation : Ayurveda or the science of life is eternal because it has no beginning, and deals with things inherent in nature. There is no discontinuity either in the living process or in knowledge related to that process. Living beings have knowledge of happiness (good health) and unhappiness (ill health) along with their causes and remedies. This knowledge is co-terminous with existence. It is without beginning, exists in continuity and is therefore eternal.

We need to recognize a basic fact that from an early point of time, all knowledge was set by the Indian ancients in deeply spiritual, philosophical and religious roots. Their value system gave importance only to their ideas and teachings, while details of their personal identity and lives were avoided as being of no consequence. Formal chronological history as we understand it, did not count for much. We therefore know very little of the dates, identities and personal details of the great founders and pillars of Ayurveda, but we do know only what they so greatly contributed to this branch of knowledge.

The Indus River civilization that flourished from about 2700 to 1500 B.C. provides the oldest archaeological evidence of Indian antiquity. In an incisive and persuasive study, David Frawley considers the Vedic civilization to be far older, indeed that the Indus Civilization was part of it. The advanced urban planning of roads, water channels, baths and drains seen in the excavations of Mohenjo Daro and Harappa point clearly to an awareness of hygiene and public health. The Rig Veda (1.24.9) however makes reference to, possibly the more ancient tradition, with the existence of hundreds of doctors and thousands of medicines. The Atharva

Veda (VIII-7-23-26) lists a number of animals that seemed to recognize and utilize several plants with medicinal properties to deal with their own illnesses. Later Charaka picked up the same line of thinking and recommends observation of the practices of animals and forest dwellers. The suggestion here is that instinct and observation is an innate capacity of sentient beings that leads them to a basic knowledge and experience of medical value for their own self-preservation. It is in that extended sense we must understand the Vedic declaration that Ayurveda is as old as sentient creation.

The earliest documented reference to Charaka and Susruta were in a set of manuscripts that came into the possession of a British soldier, Lieutenant Hamilton Bower (and therefore named after him) in 1890 in the desert town of Kuqa in Central Asia where he was camping while in pursuit of an Afghan bandit who had murdered a British trader. The manuscripts which are today housed in the Bodleian Library in Oxford, first reached the hands of Dr. Hoernle, a Government palaeographer at Calcutta, who immediately recognized the far-reaching value of their contents. The contents of the manuscripts were dated to around 400 BC, and this led historians like Hoernle and Hessler, to date Charaka and Susruta to at least a few centuries earlier. References to the name Susruta in the Ashtadhyayi of Panini, who was placed around 700 BC at Taxila by the historian Goldstucker, were therefore thought to take Charaka and Susruta back to around 1000 BC. The name Charaka however, recurs through later centuries, one of them figuring in an ancient Chinese translation, as the court physician of the Emperor Kanishka of the Kushan dynasty, who is dated to around the 2nd. Century AD. Another suggestion links the Charaka as a member of an itinerant clan of physicians who practised the medical knowledge set out in the Charana Vidya, considered a lost recension of the Atharva Veda.

Any survey of Ayurveda can best begin from the texts of the Charaka Samhita and the Susruta Samhita, whose earliest origins under the titles of Charaka Tantra and Susruta Tantra go back as stated above, to around 1000 BC. Together with a masterly update of Vagbhata in the Ashtanga Hridaya around the 6th Century AD, the three are recognized in the Ayurvedic tradition as the Brhat-trayi or Great Trinity. Another triad of authorities to be so recognized, though of lesser importance, were the Madhava Nidana, the Sarangadhara Samhita, and the Bhava Prakasha. The three works of the Great Trinity are so recognized because they carry technical information on their subjects in such comprehensive detail that they remain the authorities guiding the practitioners of Ayurveda till the present day. Even the best works of scholars of today depend heavily on the content of these texts, We can do no better than follow these great Samhita texts for our own gaining a sense of this great science of Ayurveda, which is accepted as perhaps the oldest and most comprehensive human effort to study and codify medical knowledge, and to many aspects of which, modern medicine has begun to pay obeisance.

Predictably, these texts begin with declaring the divine origin of Ayurveda as having been composed in 10000 verses spread over 1000 Chapters by the Creator God, Brahma himself. (Susruta Samhita 1.1.5). Brahma passed on the knowledge to his son Daksha Prajapati from whom it passed through the Asvini Kumaras to Indra. How the knowledge passed from this divine level to the human level is told in the Charaka Samhita. It would appear that at the onset of the Kali Yuga, (dated to 3010 BC) the leading Rishis of the time, assembled in a holy location in the Himalayas to consider how to bring relief to the common people who were suffering from diseases and also a declining life-span. They knew that the god Indra held the knowledge for this, and therefore deputed the Rishi Bharadwaja to meet Indra and seek instruction from him. After returning from this mission, Bharadwaja transmitted the knowledge to several Rishis. One of them, who stood out in merit was the Rishi Atreya, who then imparted the knowledge to six disciples, one of whom was Agnivesa, who finally codified it into the first systematic text of Ayurveda. It was left to his student Charaka to complete a redaction of Agnivesa's work, and it is this work, named by him as the Agnivesa Tantra, that later evolved into the Samhita format and has finally come to us as the Charaka Samhita. The text continued to be transmitted in the oral tradition, till through perhaps several redactions it was finally reduced to record by Chakrapani Datta in his Ayurveda Dipika along with a monumental commentary in the 14th. Century AD. It is this version that is available to us today.

It is clear that much of the medical experience of the earlier tradition found expression in terms of powers and activities of gods in the Vedas. The Rig Veda carries several instances of the medical prowess of Indra, the Asvini Kumaras and other deities of the Vedic pantheon. It is the Atharva Veda, however, where the emphasis on medical knowledge and experience at a human level, is more pronounced and detailed to such a degree that Classical Ayurveda of the later times, as in the Samhitas of Charaka and Susruta, acknowledged their debt to the Atharva Veda and thereby got the stamp of Vedic authority to their work. Indeed Vedic authority became virtually a touchstone for authenticity of work of any kind in the post-Vedic period. Buddhist works, though they had a lot in common with the basic Vedic concepts, were the exception which did not accept Vedic authority. The Buddhist tradition, rooted as it was in compassion and concern for human suffering, had much to contribute to medical knowledge and practice, specially the establishment of institutions devoted to public health.

The Charaka Samhita refers as stated earlier, to its originating as the Agnivesa Tantra. A Tantra had the format of a monograph while a Samhita had a far more formal structure that was obliged to conform to as many as 32 prescriptive features. This process of the Tantra evolving as a Samhita may have been completed around the 2nd. Century AD if we are to link it to one Charaka who figured as court physician of the Emperor Kanishka of the Kushan dynasty. This development into the Samhita is seen to be marked by a fundamental shifting of Surgery from a position of eminence in early Vedic times to its progressive decline and sidelining in post-Vedic times. This was accompanied by an increasing prominence of the disciplines of General Medicine as reflected in the Charaka Samhita. This was clearly related to the Buddhist reaction to the Vedic tradition, which brought about a great emphasis on human compassion, specially in respect of treatment of animals. This resulted in a progressive elimination of animal sacrifice from the Vedic tradition, and a shift towards ritualistic purity which disapproved of the contact with flesh and blood occasioned by Surgical practice. This resulted in the unfortunate loss of the creative contribution of the learned classes to Surgical knowledge, and the social side-lining of Surgical practice, which then passed progressively into the lower social classes. Typically, the barber progressively became a surgeon, and his wife became the midwife, a situation that can be found to survive in traces till the present day in rural India.

It is important for the reader to understand the fundamental difference between the methods of investigation of modern science and of the methods of investigation of the ancient Rishis of India, in respect of all physical matter and processes. Both approaches have their own merits but proceed from different fundamentals which bear no logical comparison. Modern Science starts with a hypothesis and first observes matter as it exists and behaves, and then, how it changes under different conditions of heat, pressure or electrical or chemical stresses created with the help of equipment. Typically matter was split progressively into it smaller components, down to the level of the molecule and atom and beyond, to the sub-atomic level. Inferences were then drawn on why matter exists as it is, or behaves as it does.

The Rishis, who were scientists in their own right, though in a different class, proceeded on an altogether different approach. They relied for their investigations not only on the external faculties of observation, but much more on the internal faculties of intuition and reason. Their analysis was through conceptual components of all that added up to or evolved as all that exists. They derived all of Existence from a single entity, the Highest Divine, that

manifested through two basic entities, energy and intelligence, and proliferated into a vast multiplicity of form and function, characterized by states, properties or qualities which reflected their behaviour. The ancient experts in the art of sculpture captured this cosmic process in the most remarkable symbolism of Siva's Cosmic Dance of Creation. This conveyed at one stroke, the idea of cosmic energy and intelligence in a vast variety of forms : the various movements of the dance, the sounds of the drum that encompassed at once the elements of speech and song, the beats of the drum showing the periodicity of time and reflecting the frequencies of the different forms of energy, and the wealth of meaning conveyed by the poses or mudras of the dance. This symbolism was beautifully described by Fritjof Capra as a metaphor that "unifies ancient mythology, religious art and modern Physics". Fritjof was clearly referring to the findings of modern Science, specially the findings of Heisenberg who removed the line that divided matter and energy and Einstein who expressed their equivalence in a simple equation.

The Rishis carried their large perspective of all forms of existence into the understanding of human physiology and set out their understanding as the principles of Ayurveda. The basic elements of energy and intelligence were then considered to evolve, through proliferation and combination, into the more gross components of Fire, Earth, Air, Water and Space, collectively called the Pancha Bhuta. These in turn, combined to form the Dhatus, with properties and qualities, including three called the Doshas, which finally took the vast variety of forms and functions of the different organs of the body. It is thus seen that the elements and components of existence were presented as original physical entities in Western Science but as evolutes of conceptual entities in Indian Science ! But while their respective methodologies of investigation have starting points that seem poles apart, yet Western Science seems today to be arriving at the ancient Indian finding of a fundamental origin of all that exists, in terms of energy and intelligence,

Modern medicine assumes that the organs and functions of the human body are ultimately constituted as a vast network of different types of molecules using electrical and chemical energy transmitted through nerves and blood vessels to exchange messages of intelligence, that determine their behaviour in their respective organ locations. The fact that even chemical messages, as in the case of some poisons and drugs often get an instantaneous response as in the case of electrical message, would suggest a close relationship between chemical and electrical energy. Indeed both forms do indeed derive ultimately from the electron, which bears electricity directly, and also drives chemical interaction of matter at the molecular level. We see at once how modern science approaches the findings of the Rishis that all that exists is but one fundamental entity differentiated in a variety of forms of matter and energy possessed of an intelligence that determines their properties or behaviors and accounts for the corresponding variety of their functions.

With this background, we may consider some aspects of the Charaka Samhita in a slightly greater measure of its conceptual and technical detail so that we may get some idea of its foundational status in the ancient Indian tradition. The Samhita consists of 120 Chapters spread over eight parts :

Sutra : covering basic topics on pharmacology, food, diseases, physicians and some philosophical topics.

Nidana : dealing with causes of diseases.

Vim Ana : on nourishment and pathology

Sarira : on anatomy and embryology.

Indriya : on diagnosis and prognosis.

Cikitsa : on therapy

Kalpa : on pharmacy.

Siddhi : on additional general therapy.

The Samhita can be seen as a composite work, of many contributors over long periods of time, but specifying Charaka as the main compiler who is named at the concluding part of the first six Chapters, and also Drdhabala, who is dated tentatively around the 4th Century AD, named as the compiler of the last two Chapters. A reference within the text (6.30.316) makes reference to the need to take note of the dietary habits and preferences of people of distant regions, like the Persians, Greeks and Chinese, which would suggest a contributor familiar with these disparate facts, or a general knowledge about them that may have prevailed. And what is of special interest is the contribution to the development of medical knowledge by interaction of scholars at meetings like the Yajjhapurusiya Parishad, something like the modern seminar, where learned scholars assembled and debated important issues.

Charaka's view was that much of the medical knowledge and practice that prevailed in his time and which he absorbed into his work, were not adequate. An understanding of medicine had to set the transient structure and functions of the human body within a more enduring philosophical framework of the nature and purpose of human existence itself. He took pains to derive all his conclusions from its philosophic moorings of the early Samkhya doctrine of one single Avyakta or entity, evolving through 24 basic categories into the vast multiplicities of form and function that constitute all of existence. All matter was thus derived from five basic elements, the five Mahabhutas, namely Ether, Air, Fire, Water and Earth, Even these evolved in that sequence, one to the next, and each carrying a proportion of its properties to the next, in the manner characteristic of the processes of creation and evolution. Thus for instance digestion of food in the stomach was considered to be accomplished by a fire (amasaya) and resulting in chyle (ahararasa) or nutritive essence which was transformed by the fire component of the five bhutas, the basic elements, into the dhatus from which all parts of the body were generated.

The Samhita remained completely eclectic in drawing from even conflicting doctrines. Despite the Buddhist denial of the authority of the Vedas, it found an appeal in the Buddhist concept of attributing human suffering to the impact of transient sensory experience and that relief from this could be obtained through the simple remedy of giving up covetousness that was born of that experience. The concept rests on a simple and compelling logic. All sensory experience is brought in from the external world by the five sensory organs, into the mind, where it is registered by cognition, confirmed by recognition and sensed as pleasant or unpleasant. All these are simple passive processes that are mechanical and harmless. Then comes thought with the intent of a response, followed by the response as an action, These two are the first active processes consciously initiated by the individual, an action that inevitably results in a reaction that could be both internal and external in its impact, and could be beneficial or harmful. The benefit or harm is inevitably both to oneself or to others. To oneself the benefit and harm translate as good health and ill-health. To others, they translate as social harmony or conflict. This is how the operation of

Karma within our lifetimes has to be really understood, without necessarily having to accept that it operates through past or future lifetimes as well. These two effects then colour all future responses and makes the person what he is and becomes : at peace or at war with himself or with others. This is a clear assertion of the man's being endowed with a free will, and being the maker of his own destiny. The driving intent behind all actions, the first response of the mind is the cause of all results that follow : compassion leading to happiness and covetousness leading to suffering, both to oneself and to others. The widespread practice of medicine by Buddhist monks and medical services provided in Buddhist monasteries and the wide network of public health arrangements established by the great Buddhist rulers like Asoka can be seen to be a direct outcome of the emphasis of Buddhism on compassion as a prime mover of human conduct.

Building on these basic perceptions, the Charaka Samhita explains ill-health in general terms of infection arising from contact of all the senses with inappropriate or contaminating objects. Infection comes not only from the obvious physical contact of touch, smell and taste, but even of sight and hearing, where contact is not so obvious, but where the impact is real. The underlying idea of course, is the philosophical context of how the individual is enslaved by the senses and drawn into the conflicts and dualities of the external world, which bring turmoil to the mind, with the consequent impact upon the body. It is this large philosophical perspective of the Charaka Samhita, without loss of practical detail, that has held all later scholars of medicine in awe and led them to regard it as their ultimate fall-back authority.

The detailed descriptions of the organization and functioning of hospitals, the training and performance of doctors. and the preparation of medicines from a vast pharmacopoeia set out in the Charaka Samhita are truly remarkable. The initiation of a person into the medical profession (Ca 3.8.13,14) bound him to a detailed code of ethics, similar to, and perhaps more stringent than the Hippocratic Oath : to lead a celibate life, speak the truth, adhere to vegetarian food, subject himself completely to his teacher, except when there was an ethical conflict, serve patients day and night, never exploit them in any way, and respect and preserve their privacy. This speaks of an advanced system of medical services which, thanks to later Buddhist influence, were made available to the poorer classes, who perhaps could not afford the medicines or treatment procedures prescribed by the regular doctors. The famous Asokan edit at Girnar dated to around 320 BC declared as follows :

Everywhere in the domain of King Priyadarshin, beloved of the gods, and of his neighbours the Cholas, Pandyas, Satyaputra, Keralaputra up to Tamraparni, of the Greek King Antiyoka and his neighbouring kingdoms, everywhere has provision been made for medical treatment of two kinds, for men and for animals. And where no medicinal herbs suitable for men and animals are grown, such herbs have been caused to be planted. And along the roads wells have been dug and trees planted for the use of men and animals.

Later in the 5th Century AD, the Chinese pilgrim Fa Hsien accorded lavish praise for the Arogya Salas or public hospitals in the Pataliputra area (modern Patna) established as acts of piety by well-to-do citizens for the benefit of the poor. The Samhita makes also considerable reference the prevalence of epidemics, attributable to mosquitoes, rats and rodents and infected water sources. All these speak of a fairly well established arrangements even from the time of Asoka making them perhaps the world's first organized system for public health.

In a Chapter entitled “Eight Sets of Three”, the Charaka Samhita presents eight topics each covering sets of principles in triads, in an interesting grouping of disparate topics. One sees everywhere in this work, this mode of presentation of principles and concepts, followed by detailed elaboration. Thus Charaka lists three kinds of strength, three sources of disease, three types of illness, three paths of disease, three kinds of medicine and not the least, three kinds of physicians. To illustrate, for example, he lists three sources of disease as the over-use, the under-use and the abuse of three things : sense-objects, actions and time. He then elaborates each of these further. Thus looking too long at too bright or too distant objects counts as over-use. Not taking notice of anything is under-use. And looking at frightful or horrible things is abuse. This sort of elaboration is applied to the other two areas, actions and time. Actions for instance covers use of speech, mind or body. Time covers seasons of the year or time of the day that is appropriate or otherwise for any undertaking. Over-use, under-use or abuse under any of these heads has its inevitable effect on one’s well being.

The three kinds of diseases are described as those caused internally, invasively and mentally. The three paths that disease takes refer to the extremities, the skin, blood and fluids; the vital points and the bone-junctions, which include the heart, head, sinews and tendons connecting the bones; and finally the trunk housing the stomach, that holds all digested and undigested food. The three kinds of medicine are those resting on the sacred, like prayers, penances and pilgrimages; those resting on reason, like diet and medicine; and those that rely on good character. And finally three types of physicians include those who are learned, those who are of limited learning or understanding, who are quacks and those who are total impostors posing as doctors.

An interesting principle that has been stressed is that harm could come from suppressing simple natural urges such as sneezing, yawning etc, On the other hand, there was clearly need to suppress harmful urges arising from ill-will, cruelty etc. The text devotes a section on how to get rid of bad habits and the need to undertake a thorough cleansing preventive therapy at least thrice a year.

Athreya’s long discourse to Agnivesa, quoted by Charaka on the cause of epidemics could have direct relevance to the prognostications of those who today spell out the disasters that will come from the unbridled corruption of the environment that we witness today. He traces the outbreaks of epidemics to the corruption of the air, water and every part of the environment, and all this is rooted ultimately in the corruption of man’s own character with the unbridled growth of greed and spread of unrighteousness. He describes how this gets a great impetus when the ruler himself is unrighteous. (To be read as policies of Governments of today, that promote inequity and injustice and show scant respect to the way air and water are being corrupted by rapacious industrial practices) Athreya sums up the way all this harm accrues : “... the rains do not provide water at the proper time, or it rains in the wrong way. The winds do not blow properly, The earth suffers disaster. The waters dry up. The herbs become denatured and mutate. Then they bring epidemic destruction on the localities because of corruption in what one touches and in what is edible.....”

In an obvious reference to the Sathya Yuga, Athreya says that there was once a Golden Age, when righteousness reigned and a people lived long and full lives, But with each subsequent age, all the goodness and blessings that came from it waned. In his words, “....

Some well supplied people received too much, and because of this their bodies became heavy. Because of this corpulence, they became tired. From tiredness came apathy, then accumulation, and from accumulation, ownership. And ownership led to the appearance of greed Then, in the Silver Age, greed led to perfidy, from perfidy came lying, and from lying proceeded anger, pride, hatred, cruelty, violence, fear, suffering, grief, worry, impetuosity and so on “ Interestingly Athreya considers war a form of epidemic. “Unrighteousness” he says, “is the reason a country is blighted by force of arms. Some people possess disproportionate amounts of greed, anger, delusion and pride. Such people despising the weak, attack each other with weapons, as a way of assaulting their very own people or their opponents....” The two World Wars and the countless conflicts of modern times clearly continue to exemplify these ancient insights !

In relation to therapy, one finds Charaka’s explanations always beginning with underlying principles, before elaborating on practices. Typically, Agnivesa is quoted as asking why a person having fever is given hot water instead of something cold as logic might suggest. And in explanation, Athreya replies that fevers often originate from ailments in the stomach, and these ailments are amenable to digestives, emetics and depletive therapies. Hot water aids digestion and hence aids in therapy. But there were other conditions when administration of hot water would not be appropriate. Each remedy had to be determined in relation to several factors, and therapy was not necessarily a matter of off-setting with simplistic opposites of symptoms.

One of the most fascinating passages in the Charaka Samhita is a sharp debate between Athreya and Bharadwaja on the topic of Heredity. Their discussion brings out a lot of detail in respect of the processes of conception, pregnancy and birth and the play of various factors that affect the character of the individual. Athreya starts with an elaborate description of how, when the male sperm in good condition unites with the menstrual blood (we may read this as ovum) in a female womb that is not compromised in any way, the embryo is formed. It grows free from disease with the help of nutritive juices and being nurtured by the right kind of care. And as it comes to full term, it is furnished with all its organs and attains strength, and mental faculty all leading to a normal birth. Bharadwaja contradicts Athreya on each point, requiring the latter to substantiate each with reason and fact. A typical objection is that if nutritive juices contribute to the growth of the foetus, then the foetus should reflect the characteristics of different types of food taken by different mothers. Athreya explains that even when mothers take different types of food they generate the same nutritive principles that contribute to their own growth and therefore to the growth of the foetus !

Charaka shows a remarkable insight into Anatomy and much of this is derived from the prevailing practice of cadaveric dissection. The count of bones in the body was set at 360, more or less in agreement with the Atharva Veda. Susruta’s count was 300, and the modern count is around 200 where the difference stemmed from including teeth, ligaments and hard tissues in the larger counts. Interestingly, in Hymn X-7-13, the number of bones in the spinal column is given as 33 and are referred to as devas, reflecting a larger perspective of regarding the devas or gods as powers that control the various organs and functions of the body. Charaka shows considerable knowledge of the location and functions of various internal organs, and postulates a vast network of channels named Dhamanis, Siras and Srotas connecting all parts of the body and feeding them with blood, and various nutritive and other fluids. As briefly mentioned earlier, digestion of food in the stomach was considered to be

accomplished by a fire (amasaya) and resulting in chyle (ahararasa) or nutritive essence, and also waste products (mala). The chyle was transformed by the five fires of the bhutas, the basic elements, into the dhatus from which all parts of the body were generated. The malas included the three doshas which were retained in the body while the rest were eliminated. The doshas, of course pervaded the entire body and paid a critical part, contributing to good health when in balance, and ill-health when not balanced.

The role of three doshas, commonly represented as wind, bile and phlegm, is briefly anticipated in the Atharva Veda, but become the centre piece in Charaka's presentation of cause and remedy of disease in Ayurveda. The doshas are represented as specific substances, rather than as principles, and arising as part of the by-products of the process of digestion. They are not eliminated but remain, a pervasive presence in the body, supporting well-being when in equilibrium, but triggering disease whenever and wherever not in balance. The entire process of diagnosis is addressed to identifying the location and impact of such imbalances and the entire process of treatment is addressed to interventions that would restore the balance by augmenting the doshas that are in deficit or reducing them wherever they are in excess. Such identification is enabled by a careful observation of symptoms that are attributed to one or more of the doshas or their overall state of balance. While modern medicine has developed a vast array of diagnostic tools of and therapeutic interventions, one can see that the ancients did manage to assemble a vast pool of empirical experience, based upon simple visual observation and reasoned analysis, that have often obtained comparable results. While modern pharmacopoeia has established drugs in terms of pure chemicals, the ancients did manage to assemble a vast pharmacopoeia of remedies in terms of their composite natural state.

The Charaka Samhita remains predominantly a textbook of Medicine and Charaka himself emerges as a Physician par excellence. There is a reference in the Samhita to problems that needed to be remitted to other specialists, which could be an oblique reference to surgical problems. The shift of Vedic orthodoxy away from Surgery in the post Vedic period has already been referred to. But in earlier times Surgery was certainly part of mainstream medicine, though developing inevitably into a specialty. The story of ancient Surgery appropriately belongs to Susruta, who may well be regarded as the world's first professional surgeon. To Susruta, therefore, we may appropriately now turn.

CHAPTER – 4 : SUSRUTA



Statue representation of Susruta at the Patanjali Yogpeeth, Haridwar, Uttarkhand.

त एते मनः शरीराधिष्ठनः

ta ēte mana: śarīrādhiṣṭhāna:

They (diseases) have their seat in the mind and body
-- Susruta Samhita

Susruta ranks with Charaka as the two ancient scholars of India who gave the widespread and ancient but disorganized knowledge and practices of medicine of the more ancient society, the formal shape and status of a professional discipline. Their work divided the discipline into the twin specializations of Medicine and Surgery respectively. The origins of Charaka and Susruta as already described, are shrouded in obscurity and are largely speculative derivations from the text context dated to around 400 BC as they appear in the Bower manuscripts. This text content led historians like Hoernle and Hessler, to date Charaka and Susruta to at least a few centuries earlier. References to Susruta in the Ashtadhyayi of Panini, who was placed around 700 BC at Taxila by the historian Goldstucker, were therefore thought to take the original texts to around 1000 BC. The original texts were described as Tantras which evolved through redactions over several centuries into their final format as Samhitas around the 2nd. Century AD.

The opening verses of the Susruta Samhita present it as originating as a teaching of Divodasa, the King of Kasi (modern Varanasi). We see here, Divodasa declaring himself to be an incarnation of Dhanvantari, the physician of the Gods, taking human birth as a human to bring longevity and health to suffering humanity. Susruta was his star pupil who composed his teaching into what became the Susruta Tantra. It is interesting to note that Divodasa began his teaching, by asking his pupils, which branch of Medicine they would like to learn. The students readily opted for Salya or Surgery, which Divodasa at once endorsed as a wise choice. This is an indication of the high reputation that Surgery enjoyed at that time. It was unfortunate that in later times Surgery lost its pre-eminence due to several reasons referred to earlier.

The teaching was recorded by Susruta as a Tantra, which was in the format of a monograph presenting a comprehensive treatment of the subject. Ultimately, as it evolved through several redactions of later centuries, marked in some cases, by a loss of detail in the text in respect of some important surgical procedures, which seems at variance with Susruta's deep attention to critical detail. The overall text ultimately took the more formal format of a Samhita, which as described earlier, had to conform to an elaborate definition involving 32 obligatory criteria. Apart from an increased emphasis on Medicine in the later redactions over these centuries, these changes also imported Vedic features like respect for the brahmin class and other elements of ritualistic orthodoxy. The fundamental shifting of Surgery from a position of eminence in early Vedic times to its progressive decline and sidelining in post-Vedic times was clearly related to the Buddhist reaction to the Vedic tradition, which brought about a great emphasis on human compassion, specially in respect of treatment of animals. This resulted in a progressive elimination of animal sacrifice from the Vedic tradition, and a shift towards ritualistic purity which disapproved of the contact with flesh and blood occasioned by Surgical practice. This resulted also in the more unfortunate loss of the creative intellectual contribution of the learned classes to the subject, and the social side-lining of Surgical practice, which then passed progressively into the hands of the lower social classes. Typically, as stated earlier, the barber progressively became a surgeon, and his wife became the midwife, a situation that can be found to survive in traces till the present day in India. Buddhist influence also clearly had a larger social impact in terms of the spread of public medical facilities for the benefit of the poorer classes, who perhaps could not afford the medicines or treatment procedures prescribed by the regular doctors. Reference has been made earlier to the country wide network of medical facilities by the Emperor Asoka, also evidenced in the record left by the famous Chinese pilgrim Fahien in the 5th Century AD.

The Susruta Samhita, is considered to be the end version of a basic Tantra core created by Susruta, but elaborated over several redactions over several centuries till it acquired its present form around 200 AD. The last two parts of the work are thought by some to be contributions of Nagarjuna, whose identity and time is in doubt. One version identifies him with the great Buddhist philosopher who bore that name, but this is generally discounted on the ground that his Buddhist views were quite incompatible with the Vedic influences that persisted in the work. The Samhita is presented in six broad sections : Sutra : background and general principles; Nidana : symptoms, pathology, prognosis and surgery; Sarira : embryology and anatomy; Chikitsa : on therapy; Kalpa : on poisons; and Uttara : on miscellaneous topics including ophthalmology, dentistry, care of children and diseases attributed to demons or supernatural causes. A more formal structure presents the Samhita in 120 Chapters under 8 Sections dealing respectively with Salya (Surgery), Salakya (Head-Neck disease), Kayachikitsa (General Medicine), Bhuta Vidya (Diseases with Supernatural causes), Kaumara Bhartya (Pediatrics), Agadatantra (Poisons), Rasayana (Rejuvenation) and Vajikarana (Virility). With specializations bearing these names, one gets the feeling of walking through a modern hospital.

Susruta goes into great detail of how a surgeon should be trained and how many types of operations should be performed – details in such technical depth that are clearly what only an experienced practising surgeon could have given. Details are given of cataract operations, removal of stones in the bladder, plastic surgery like repair of torn earlobes or cut noses, suturing, blood-letting, removal of arrows and splinters, wounds and burns, fractures and dislocations, dissection of dead bodies for a study of anatomy etc. Risks had to be explained to patients and where it was life threatening, it had to be notified in advance to and clearance obtained from the authorities.

The following description of the procedure for dealing with intestinal obstruction or perforation which was considered risky, gives an indication of the level of knowledge and skill that obtained then. After an initial preparatory administration of lubrication, fomentation and massage, an incision was made to the left of the umbilicus, and intestinal loops, measuring four fingers were brought out at a time, cleaned and repaired where necessary, painted with honey and ghee, restored to the normal position and then the abdominal incision was sutured. In the case of an intestinal perforation an unusual mode of suturing was adopted. A large black ant was made to bite with its mandibles across a wound to bring its edges together. The body of the ant was then broken off, leaving its head as a clamp to keep the wound edges together : a remarkable alternative to the stapler of modern times !

In this connection, it is to be noted that the Samhita speaks of and describes 101 blunt and 20 sharp instruments to perform various surgical

procedures. Interestingly, while speaking of blunt instruments, Susruta speaks of the human hand itself being the best and most versatile ! There is a robust commonsense and homely simplicity that frequently comes through in the Samhita amidst a great mass of practical and technical detail. With engaging directness, Susruta says whoever cures a patient, is a doctor, and whatever cures a disease is a medicine ! There are, of course, mind-boggling details of surgical training, pre- and post surgery preparations of the patient and the operating room, the instruments, medication, the temperament and knowledge of the surgeon and his assistants, the need to give the patient details of the operation and possible outcomes, the need to notify authorities in advance of high risk operations to pre-empt blame for possible untoward consequences, etc These are working details where the modern surgeon would himself be on familiar ground. The modern surgeon would of course be taken aback at how physical control of a patient while undergoing surgery was managed in those days without the benefit of anaesthesia. The patient was perhaps given some wines for their analgesic effect, but more commonly immobilized by a pair of able bodied assistants who kept the patient pinned down physically !

Kings of ancient times needed to be guarded against external enemies through weapons and internal enemies through poisons, People also faced the same threat from weapons of local enemies and poisons of snakes. Trauma and Poisoning naturally posed a huge problem that occupied a great part of time of doctors and surgeons, and thus make for a sizeable presence in the Susruta Samhita.

A fascinating aspect of the medical practices of those times was the reliance on animals, not merely in respect of animal products, but in utilizing them live in remedial procedures. One procedure, as already described was the use of ants to aid in suturing. This is described both by Susruta (Su. 4.2.56) and Charaka (Ch.613.188). One other example of use of animals was the use of birds like the quail, to bite with its beak across a cut across the site of a snake bite, where the bird would then suck out the poison. A more common example was the use of leeches in blood letting. A lot of details are provided on several species of leeches. Considerable attention is given to injury arising from different types of animals, and specially snakes. One curious but interesting feature in respect of snakes is their classification by the four caste names of human society !

While the practice of blood letting rested on the assumption of a need to eliminate corrupted blood from the body, care was taken that this was not done to excess. For Susruta emphasized “Blood is the root of the body. Blood alone keeps it going, therefore one must guard it diligently. Survival comes from realizing that blood is life” Obviously related to this emphasis, is the nutritive component called the Rasa, which is the nutritional essence of all food coming from the stomach and circulated throughout the body for its nourishment. The Rasa is said to “move

throughout the body like an 'anu', or atom in a manner similar to sound, light and water". And related to this concept of the movement throughout the body is the role of Vata or the wind humor, which would appear to provide the motive force of pressure driving all movement within the physiological system. Vata is thus seen to represent the dynamic physical movement, as against the chemical action of Pitta and Kapha, the other two components of the Tridosha triad, in the organs at the different bodily locations, all together accounting for the total health of the body. All this point to a profound understanding of the fundamental physiological processes of the human body arrived at, from the faculty of not only sight, but also insight, not only intuition but also reason. The reader may recall our earlier explanation of the fundamental difference between the methods of investigation of modern science and of the methods of investigation of the ancient Rishis of India, in respect of all physical matter and processes.

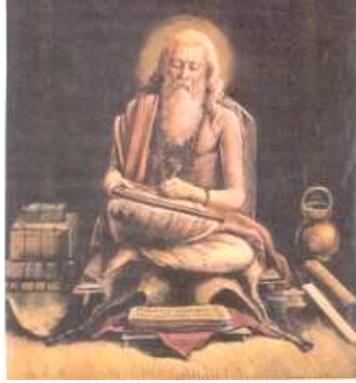
In the context of the theory of the traditional Tri-dosha theory of health being dependent on the balance of the three humours, Vata, Pitta and Kapha, or Wind, Bile and Phlegm, there is a significant emphasis assigned by Susruta to the role of Vata. He assigns to Vata the critical dynamic role of responsibility for the mobility and activity of the other two Doshas which are considered more static. There is a suggestion here that Pitta and Kapha share the basic hot-cold and dry-wet duality of the older Vedic conception symbolized in religion by Agni and Soma. The driving power of Vayu in the older Vedic conception could therefore well have led to a later medical adaptation as Vata, to make up the Tri-dosha triad.

In its day, the discovery of the Bower Manuscripts created quite a storm of interest in the West, specially in the medical profession, and triggered a major Western drive for searching for ancient manuscripts and studying surviving ancient medical practices in India. One of the most interesting outcomes of this Western initiative, was a publication in 1794 in the Gentleman's Magazine, London, of an illustrated report from two British Surgeons, Thomas Cruso and James Findlay, of their witnessing a rhinoplasty operation in accordance with the ancient surgical tradition by a local surgeon in Bombay. The person operated was one Cowasjee, a bullock cart driver with the British army, who suffered his nose being cut off when captured by army of Tipu Sultan. This was the punishment meted out to enemy prisoners as was in vogue in wars of those days. Later in 1815, Joseph Carpue FRCS, a British Surgeon who studied the ancient techniques in India, performed the first operation of this type in England. This marked the entry of this technique of plastic surgery into the Western world.

No less important was the Western study and adaptation of the great range of surgical instruments described by Susruta. In 1829, a British Surgeon, James Franklin studied how the legendary wootz steel of the ancient instruments was made from iron ore and charcoal in special furnaces by traditional craftsmen in Jabalpur district. And though the

craftsmen could not explain the principles involved, Franklin recognized that there was an inheritance of an advanced intelligence at work here. A reliable eyewitness account was given by a qualified surgeon, Dr Ekambaram, of seeing a native traditional surgeon successfully perform a cataract operation in the Susruta tradition in 1910 in Coimbatore. And to this day, traditional bone-setters run a thriving orthopaedic practice in Puttur of Chittoor District, as indeed in many other parts of India. All these facts tell a sad story of how Surgery and its support technologies got marginalized by the ritual orthodoxy of post-Vedic times and passed out of the hands of the learned classes into the hands of the artisan class, and lost forever the impetus for its creative advancement along with the other sciences which made great strides. On the medical side, Ayurveda itself remained virtually unchanged. The next and possibly the last great systematization came in the 6th. century AD, with the arrival of the third great figure of Ayurveda, Vagbhata, to whom we now turn our attention.

CHAPTER – 5 : VAGBHATA



Vagbhata as represented in a painting

नित्यं हिताहारविहारसेवी समीक्ष्यकारि विषयेष्वसक्तः

दाता समः सत्यपरः क्षमावानाप्तोपसेवी च भवत्यरोगः

nityam hitāhāravihārasēvī samīkṣyakāri viṣayēṣvasakta:

dātā sama: satyapara: kṣamāvānāptōpasēvī ca bhavatyarō

One who enjoys wholesome food and activity every day, who introspects on his actions; who is unattached, generous, who looks on all with an equal eye, who is truthful and forgiving; who delights in the service of virtuous men; he remains free from illness.

----- From Vagbhata's Ashtangahridaya -----

The Ashtangahridaya of Vagbhata remains to the present day, even after 14 centuries, the most authoritative and popular reference work for practitioners of Ayurveda. This is not little due to its eliminating redundancy and outdated content of all earlier works including the Charaka Samhita, while retaining all that remains relevant and important. And at the same time it is couched in Sanskrit poetry with astonishing brevity and delectable beauty that generations of students and practitioners have found so charming and easy to memorize and internalize. The following verses provide a telling sampling of these features of Vagbhata's work :

The essence of ancient texts which enshrined knowledge in a scattered form has been distilled and presented in Ashtangahridaya which is neither unduly long or short.

Vata, Pitta and Kapha are the three doshas; in equilibrium, they sustain the body and in disequilibrium, they destroy it.

In the underuse, misuse and overuse of time, sense objects and activity lie the roots of ill-health; their appropriate use ensures good health

While eating a meal, half the stomach should be filled by solids; a quarter by liquids , and a quarter left for free airflow.

The fires burning in each tissue are parts of the fire ablaze in the stomach; tissues grow or deplete when the fires burn brightly or weakly. (A beautiful way of explaining how the body maintains the normal temperature of 98.4 degrees Fahrenheit !)

Therapeutics which settles one disease but triggers another is a flawed practice of medicine.; proper treatment settles the primary disease but gives rise to no other.

As stated earlier, the rise and acceptance of Ayurveda as a full-fledged formal system of medicine is associated with the compilation of Samhitas of Charaka and Susruta, and carried forward with a full authentication in the Ashtanga Hridaya of Vagbhata in the 6th Century AD. These three are recognized in the Ayurvedic tradition as the Brhat-Trayi or Great Trinity, Another triad of authorities to be so recognized, though at a lesser level were the texts of the Madhava Nidana, the Sarangdhara Samhita, and the Bhava Prakasha. Here we shall present the third of the Great Trinity, Vagbhata because it is he dominates the minds and practices of Ayurvedic practitioners of the present day.

It could be that the long interval between Charaka and Susruta on the one hand and Vagbhata on the other, could be due to the dominance during this interval of Buddhism, especially with their emphasis on reaching the poor through the vast network of public health services built by them for the benefit of the common people. Vagbhata would then represent a resurgence of the Vedic dominance and gradual waning of the Buddhist influence. Yet, this resurgence lasted only till the years of the Vijayanagar Empire in the 16th Century. Muslim influence gained ground thereafter till finally British influence prevailed and Western medicine overtook Ayurveda. If Ayurveda survived till the present day, it was because the great part of the country and its population have simply been beyond the reach of Western medical services. But today, more interestingly and importantly, Western medicine has begun to recognize some

significant strengths of Ayurveda, specially the role of the mind, which had been long ignored because of its being rooted in philosophic concepts that were not easily understood.

As with Charaka and Susruta, not much is known about Vagbhata despite his being dated to much later times. Vagbhata's claim to fame rests on his work, the Ashtanga-Hridaya, (AH) where Ashtanga refers to the traditional eight limbs that constitute the subject of Ayurveda, and Hridaya, the heart of this subject. Vagbhata introduces this text as a distillate of the earlier authoritative text, the Ashtanga-Sangraha (AS) by an author of the same name. Scholarly opinion is divided whether that was Vagbhata himself or another person bearing the same name. Both the AS and AH follow closely the texts of Charaka and Susruta, but while the treatment of AS remains elaborate like the earlier texts, the AH has consciously opted for a concise rendering, eliminating superfluity, in order to make the subject easier and simpler for students and practitioners to follow. One can see in both the AS and the AH a considerable reference to and respect for both the Vedic and Buddhist traditions. This is attributed to the authors being trained by Buddhist teachers and even to the possibility of themselves being Brahmins turned Buddhist. The least that can be said is that they lived in times when both Vedic and Buddhist traditions had matured to a point of mutual acceptance and respect. The fact that the AH follows a good part of Dhirdabala's redaction of the Charaka Samhita, with Dhirdabala placed in the 5th Century, has been cited for placing the AH and Vagbhata soon after. One scholar has cited a verse in the Brhat-Samhita of Varahamira following a verse in the AH, to place Vagbhata before Varahamira who is dated to the period 500 to 560 AD. Various versions consider Vagbhata's place of origin in the Sind area, and his later life in different locations including Ujjain, Kerala and even Sri Lanka. Even today in Kerala, Vagbhata has the status of the patron saint of Ayurveda.

Vagbhata wastes no words on the esoteric or the philosophical roots that characterize the Charaka Samhita, and he sheds much its content that is superfluous or outmoded. He concentrates on central facts while maintaining an ethical framework. His ethics and compassion come out clearly when he says "Always regard others – even bugs and ants – as no different from oneself". What gives the AH a special appeal and flavour is that it is set in Sanskrit poetry of astonishing brevity and beauty, making it the most popular text for practitioners till the present day. In elegant verse, he says of the problem of urinary blockage, "In Sanitrmeha, slowly, slowly, does the urine flow" Switching to another metre he gives a romantic description, "Like the face of The

adorable maiden, resembling the honey laden lily, her voice echoing the sweet notes of the lute, her bed strewn gracefully with flowers, she herself takes the form of a creeper bearing flowers.”

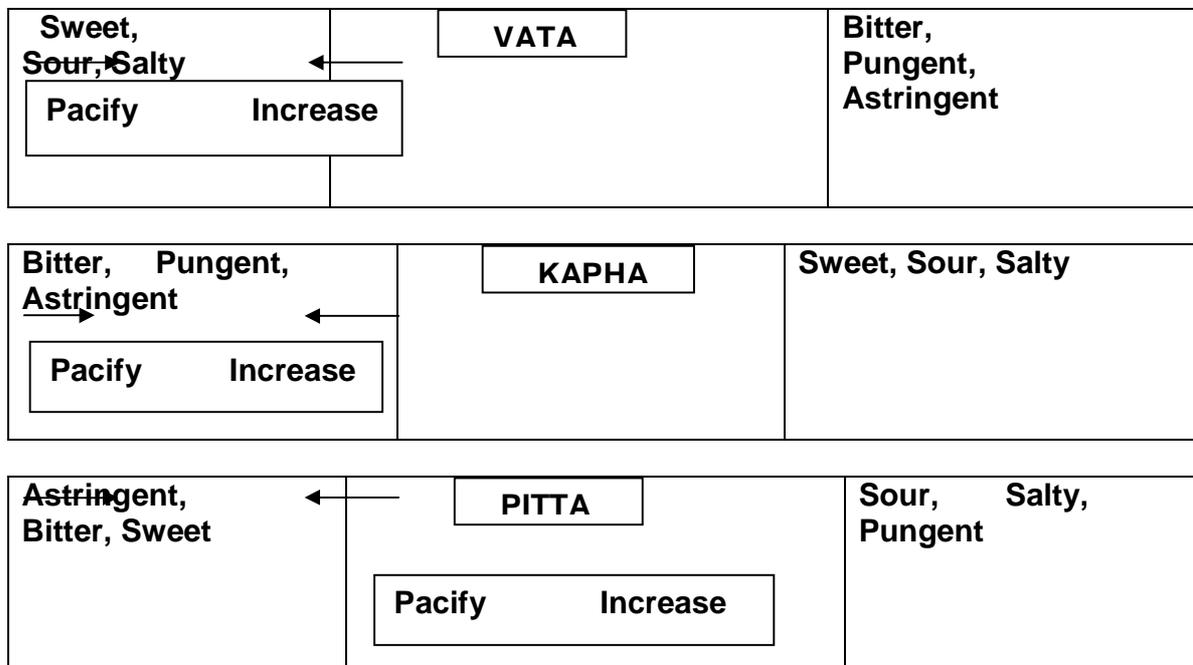
Vagbhata sticks to the ancient formulation of the Panchabhuta doctrine, Without relating it to the larger cosmic and philosophical framework so much emphasized by Charaka, he goes directly to its bearing on the structure and functions of all constituents of the human body. The Panchabhutas are the five fundamental categories of which all that physically exists, including the body and its constituents, are constituted, viz, Earth, Water, Fire, Air and Space. From a modern scientific perspective, we can see that Earth represents all atoms and molecules of all substances existing in the solid state. Water can be seen to the solvent principle with the property of fluid flow that transports all substances to all parts of the body where they are needed as nourishment or from where they are to be eliminated as waste. Fire is the energy principle that drives all chemical processes in the body. Air provides the oxygen that sustains the oxidizing element of the chemical processes, and also the pressure needed to drive and circulate all the above fluid movements. And Space is what makes the body a container accommodating all matter and activity within it. The sum total of all the chemical constituents and their interactions and movements in the body require a state of equilibrium between the constituents, where a balance represents a state of health and an imbalance, represents a state of ill-health. The nutritive elements of food are transformed into composites called the Dhatus, of which the different organs of the body are constituted, while the waste products to be eliminated are called the Malas. The overall activities of construction and destruction are moderated by three principles, Vata, Pitta and Kapha, called the Doshas whose relative proportions at any point of time determine the resulting overall state of balance and the resulting state of health or ill-health.

As its name suggests, the Ashtanga Hrdaya covers the subject under eight heads : Systemic illness (Kaya), Children's ailments (Bala), Supernatural disorders (Graha), Head & Neck Disease (Urdhvanga), Surgery (Salya), Poisoning (Damshttra), Rejuvenation (Jara) and Virility (Sukra), All these problems are attributed to imbalances in the relative proportion of the three Doshas in the body resulting as much from what we eat, drink or inhale as from what we think, say or do. There is therefore a composite mind-body impact in constant play in determining our state of health. A health problem expresses itself through a vast range of symptoms all of which must be taken note of in a holistic way for effective diagnosis. This is simply to identify the specific Doshha that is in excess or in deficit

and to what degree, that is resulting in the problem. Therapy then consists in determining what sort of intervention – nutritive, medical, surgical or other physical intervention would provide the most effective way of restoring the Dosha imbalance and provide the cure. Three Doshas each admitting to a wide range of small difference of difference, together admit of a vast range of problems, symptoms and possible interventions. This makes Ayurvedic response almost uniquely tailored to the needs each individual.

These features of the AH largely follow the formulations of the AS and Charaka and have been broadly dealt with earlier. It would however be interesting to take a more detailed look at how the AH deals with Taste which is considered an important feature serving as a criterion relevant to both diagnosis and therapy. This concept is perhaps unique to Ayurveda and is detailed here to illustrate the depths of its medical insights. Basic tastes are considered to be six in number, viz. Sweet (Madhura), Sour ((Amla), Salty (Lavana) Bitter (Tikta), Acrid (Katu) and Astringent (Kasaya). These decline in the above order, in their capacity to contribute to the strength of the body.

More specifically, the Tastes are considered to pacify or enhance the effect of the Doshas in the following way :



Beyond their basic properties, the Doshas possess the quality of potency (Virya), and are said to acquire additional properties in

the post-digestive stage. Lastly, the basic tastes are combined into as many as 63 groups, comprised of 15 combinations of 2 tastes, 20 combinations of 3, 15 combinations of 4, 6 combinations of 5 along with the individual 6. Each of these groups is associated with specific substances or formulations addressed to specific disease conditions. One sees at once how even a single insightful parameter like taste figures in such a wide range of diagnosis and therapy.

The scope and methods of Ayurveda presented in the Chapters so far will not be complete without a complementary overview of Yoga. It is important to note that while much of the focus of Ayurveda is on the health or ill-health of the body, Yoga shifts the focus to the centrality of the Mind which occupies a mid-point, a fulcrum as it were, that balances the lower physical and higher spiritual existence of the individual and integrates them as a single holistic existence of meaning and purpose. To Yoga therefore shall we now turn with the great contribution of Patanjali.

CHAPTER 6 : PATANJALI



Patañjali portrayed as an incarnation of **Sesha, the divine serpent who serves as a bed where Maha Vishnu rests through Eternity.**

The works of the Brhat-Trayi, or Great Triad, Charaka, Susruta and Vagbhata, presented so far, have their main focus on the physical well-being of the individual. They have touched, but only briefly, on the role of the mind in contributing to such well-being. But clearly the mind has a profound and holistic impact on all facets of the human personality – physical, mental and spiritual. These are facets dealt with in great depth in the Yoga Sutra of Patanjali, who is placed around the 2nd. Century BC and therefore merits a separate Chapter. Indeed it is Yoga in relation to Ayurveda that has made a great comeback today all around the world with Body-Mind medicine coming to occupy a position of importance and influence in the advances of modern medicine.

Yoga literally means Union, and refers to Union with the Highest Divine or Ultimate Reality, as the ultimate goal of human existence which is Moksha. The 18 Chapter titles of the Bhagavad Gita bear the names of different Yogas, which refer to different Paths, the final Chapter appropriately bearing the name Moksha or Liberation. The existence of the individual is said to be composed of four functional levels called Kosas or sheaths : the physical level, the mental level, the level of Wisdom, and the level of Bliss, respectively known as the Annamaya, Manomaya,

Vijñānamaya and the Anandamaya Kosas. When the individual transcends these levels, he is liberated from all the bonds imposed by physical existence, and this liberation is called Moksha.

The entire thrust of all Vedic Knowledge sets human existence as driven by four objectives : Virtuous Ends, Ethical Means, Pleasure and ultimate Liberation, represented by the words Dharma, Artha, Kama, and Moksha. Ayurveda and Yoga are the two branches of Vedic knowledge that provides the disciplines that ensure the health of the body and the mind which alone lead to the higher levels of existence, culminating in Moksha. Ayurveda has its focus on the mind and body while Yoga shifts the focus from the mind to the spirit. The two disciplines are integrated in a common framework of concept, object and method where the mind joins the physical with the spiritual levels of existence.

The various ideas and concepts related to Yoga, from different sources, have been assembled together by Patanjali, making his work, more or less, a master reference work on Yoga. The Yoga Sutra, as its title indicates, treats of its subject in the literary form of the Sutra (meaning a string, here denoting a string of thoughts, like a string of gems). The Sutra, corresponds to the Aphorism, and is a literary form with an astonishing combination of depth and brevity. The philosophical positions from which the Yoga Sutra proceeds are twofold : that the physical world and its experiences are a reality (even if relative) that must inevitably affect our actions and decisions, a position called the Satvada; and that both the physical world and its experiences are subject to constant and inevitable change, a position called the Parinamavada. From the point of view of the latter, the Yoga Sutra argues for directing the mind and body towards change for the better, and provides a methodology for doing this. The methods proposed, include a regulatory regimen for the body, and practices that give the mind the quality of steadiness in the midst of the unremitting diversionary efforts of the senses, responding constantly to the stimuli of the external world. Obviously every effort in this direction would give physical and mental fitness so essential to taking us forward on the path to whatever ultimate goal we may set ourselves.

According to tradition, apart from the Yoga Sutra, Patañjali was also the author of the [Mahābhāṣya](#), a commentary on [Kātyāyana's](#) commentary on [Pāṇini's Aṣṭādhyāyī](#) as well as an unspecified work of medical text

called the *Carakapratisamskṛtaḥ* (now lost). The Charaka Samhita itself towards the end of the Chapter called Sārīrasthāna, has a sequence on Yoga, presenting ideas developed later in the Yoga Sūtras. The tradition that holds that all three works are by Patanjali is summed up in the following verse from Bhoja's commentary on the Yoga Sūtras:

I bow with my hands together to the eminent sage Patañjali, who removed the impurities of the mind through yoga, of speech through grammar, and of the body through medicine.

The **Yoga Sūtras** present a codification of the royal or best yoga practices, as the Raja Yoga, presenting these as a eight-limbed system (*ashtāṅga*). The focus is on the mind; the second sutra defines Yoga - it is the cessation of all mental fluctuations, all wandering thoughts cease and the mind is focused on a single thought. In contrast to the focus on the mind in the Yoga sutras, later traditions of Yoga such as the **Hatha yoga** focus on more complex asanas or body postures.

In the Yoga Sutra, the mind occupies a pivotal position between body and higher faculties. All the facets of how the mind holds the balance between the physical and the moral being are treated in the Yoga Sutra in ways which any modern psychologist would be proud to own. Practice of Yoga in the light of the teachings of the Yoga Sutra would be most beneficial. And a study of the Yoga Sutra would also make for an ideal entry point for a study of the Darshanas of India.

The Yoga Sutras is comprised of the following Chapters with the number of Sutras each of them contain :

Samadhi Pada	On being absorbed in spirit	51
Sadhana Pada	On being immersed in spirit	55
Vibhuti Pada	On supernatural abilities and gifts	56

The Yoga Sutra is set out in such remarkable brevity and clarity, that its ideas can best be presented by quoting the original sutras themselves, rather than attempting a summing up or a summary in other words. The translations of the Sutras set out would give the true depth and reach of this masterly work, though of course, without the grace of the original Sanskrit.

Yoga is the ability to direct the mind exclusively toward an object and sustain that direction without any distractions. 1-2

The five activities of the mind are comprehension, misapprehension, imagination, deep sleep and memory. 1-6

The mind can reach the state of Yoga through practice and detachment. 1-12

Practice is basically the correct effort required to move toward, reach and maintain the state of Yoga. 1-13

At the highest level there is an absence of any cravings, either for the fulfillment of the senses or for extraordinary experiences. 1-15

There will be some who are born in a state of Yoga. They need not practice or discipline themselves. 1-19

Through faith, which will give sufficient energy to achieve success against all odds, direction will be maintained. The realization of the goal of Yoga is a matter of time. The more intense the faith and the effort, the closer the goal. Inevitably the depth of faith varies with different individuals and at different times with the same individual. The results will reflect these variations. Offering regular prayers to God with a feeling of submission to his power, surely enables the state of Yoga to be achieved. 1-20 to 23

There are nine types of interruptions to developing mental clarity : illness, mental stagnation, doubts, lack of foresight, fatigue, over-indulgence, illusions about one's true state of mind, lack of perseverance, and regression. They are obstacles because they create mental disturbances and encourage distractions. All these interruptions produce one or more of the following symptoms : mental discomfort, negative thinking, the inability to be at ease in many body postures, and difficulty in controlling one's breath. 1 -- 30, 31

The practice of breathing exercises involving controlled exhalation would be helpful. By regular inquiry into the role of the senses we can reduce mental distortions. 1---- 34, 35

When one reaches this state, nothing is beyond comprehension. The mind can follow and can help understand the simple and the complex, the infinite and the infinitesimal, the perceptible and the imperceptible. When the mind is free from distraction, it is possible for all the mental processes to be involved in the object of inquiry. As one remains in this state, gradually one becomes totally immersed in the object. The mind then, like a flawless diamond, reflects only the features of the object and nothing else. Initially, because of our past experiences and ideas, our understanding of the object is distorted. Everything that has been heard, read or felt may interfere with our perception. When the direction of the mind toward the object is sustained, the ideas and memories of the past gradually recede. The mind becomes crystal clear and one with the object. At this moment there is no feeling of oneself. This is pure perception. This process is possible with any type of object, at any level of perception, whether superficial and general, or in-depth and specific. 1-40 to 44

Then the individual begins to truly know himself. Then, what he sees and shares with others is free from error. His knowledge is no longer based on memory or inference. It is spontaneous, direct, and at both a level and an intensity that is beyond the ordinary. As this newly acquired quality of the mind gradually strengthens, it dominates the other mental tendencies that are based on misapprehensions. The mind reaches a state when it has no impressions of any sort. It is open, clear, simply transparent. 1---- 47 to 51

The practice of Yoga must reduce both physical and mental impurities. It must develop our capacity for self-examination and help us to understand that, in the final analysis, we are not the masters of everything we do. ---- 2-1

The obstacles are misapprehensions, confused values, excessive attachments, unreasonable dislikes, and insecurity. ---- - 2-3

There are eight components of Yoga. These are :

1. yam, our attitudes toward our environment.
2. miasma, our attitudes toward ourselves.
3. asana, the practice of bodily exercises.
4. panorama, the practice of breathing exercises.
5. pratyahara, the restraint of our senses.
6. dharana, the ability to direct our minds.
7. dhyana, the ability to develop interactions with what we seek to understand.
8. samadhi, complete integration with the object to be understood. ----- 2-29

Yama comprises :

1. Consideration for all living things, especially those who are innocent, in difficulty, or worse off than we are.
2. Right communication through speech, writings, gesture, and actions.
3. Noncovetousness or the ability to resist a desire for that which does not belong to us.
4. Moderation in all our actions.
5. Nongreediness or the ability to accept only what is appropriate. ----- 2-30

Niyama comprises :

1. Cleanliness, or keeping our bodies and our surroundings clean and neat.
2. Contentment, or the ability to be comfortable with what we have and what we do not have.
3. The removal of impurities in our physical and mental systems through the maintenance of such correct habits as sleep, exercise, nutrition, work, and relaxation.
4. Study and the necessity to review and evaluate our progress.
5. Reverence to a higher intelligence or the acceptance of our limitations in relation to God, the all-knowing. ---- 2-32

Asana must have the dual qualities of alertness and relaxation. These qualities can be achieved through Asanas by recognizing and observing the reactions of the body and the breath to the various postures that comprise asana practice. Once known, these reactions can be controlled step by step. When these principles are correctly followed, asana practice will help a person endure and even minimize the external influences on the body such as age, climate, diet, and work --
--- 2- 46 to 48

Pranayama is the conscious, deliberate regulation of the breath replacing unconscious patterns of breathing. It is possible only after a reasonable mastery of asana practice. It involves the regulation of the exhalation, the inhalation, and the suspension of the breath. The regulation of these three processes is achieved by modulating their length and maintaining this modulation for a period of time, as well as directing the mind into the process. These components of breathing must be both long and uniform.-- 2- 49, 50

Dharana is the state where the mind has reached the ability to be directed when direction toward a chosen object is possible in spite of many other potential objects within the reach of the individual. Then the mental activities form an uninterrupted flow only in relation to this object. Soon the individual is so much involved in the object that nothing except its comprehension is evident. It is as if the individual has lost his own identity. This is the complete integration with the object of understanding (samadhi). When these processes are continuously and exclusively applied to the same object, it is called samara. ---- 3-1 to 4

Samara on the interactions between language, ideas, and object is to examine the individual features of the objects, the means of describing them, and the ideas and the cultural influences in the minds of the describers. Through this, one can find the most accurate and effective way of communication, regardless of linguistic, cultural, and other barriers. ---3-17

Samara on the navel gives knowledge about the different organs of the body and their dispositions.----3-29

Samara on the origin of matter in all its forms, appearances, and uses can develop into mastery of the elements. When the elements are mastered, one is no longer disturbed by them. The body reaches perfection and extraordinary capabilities become possible. --- 3-34, 35

Perfection in the body means good features, attractiveness to others, physical firmness, and unusual physical strength. Mastery over the senses is achieved through Samyama on the ability of the senses to observe their respective objects, how such objects are understood, how the individual identifies with the object, how the object, the senses, the mind, and the Perceiver are inter-related, and what results from such perception. --- 3-46,47

The temptation to accept the respectful status as a consequence of acquiring knowledge through Samyama should be restrained. otherwise, one is led to the same unpleasant consequences that arise from all obstacles to Yoga. ---- 3-51

Freedom is when the mind has complete identity with the Perceiver. --- 3-55

Exceptional mental capabilities may be achieved by : genetic inheritance, the use of herbs as prescribed in the Vedas, reciting incantations, rigorous austerities, and through that state of mind that remains with its object without distractions (samadhi). Change from one set of characteristics to another is essentially an adjustment of the basic qualities of matter. --- 4- 1, 2

Whether or not particular characteristics appear depends on the mutations of the three qualities. The characteristics of a substance at one moment in time is in fact a single change in these qualities. --4-13, 14

Mental activities are always known to the Perceiver that is non-changing and master of the mind. In addition, the mind is a part of what is perceived and has no power of its own to perceive.-- 4-18,19

When the mind is not linked to external objects and it does not reflect an external form to the Perceiver, then it takes the form of the Perceiver itself. Thus the mind serves a

dual purpose. It serves the Perceiver by presenting the external to it. It also reflects or presents the Perceiver to itself for its own enlightenment. Even though the mind has accumulated various impressions of different types it is always at the disposal of the Perceiver. This is because the mind cannot function without the power of the Perceiver. --- 4-22, 23,24

When the mind is free from the clouds that prevent perception, all is known, there is nothing to be known. The three basic qualities cease to follow the sequence of alternating pain and pleasure. --- 4-31, 32

When the highest purpose of life is achieved the three basic qualities do not excite responses in the mind. That is freedom. In other words, the Perceiver is no longer coloured by the mind. --- 4.34

Thus we can now see that the insights of the Yoga Sutra as presented above, clearly bracket the brain with the five senses as part of the physical body, while the Mind occupies a higher non-physical position, indeed a middle position between the body and the Higher Perceiver, between Matter and Spirit, between the Human and the Divine. While the Yoga Sutra provides the theoretical aspects to exercising the faculties of the Mind, it is to be noted that detailed practical methods are prescribed in the trio of disciplines of the Mantra-Yantra-Tantra Sastras. Mantras involve meditation or repetition of holy sounds, words, phrases, or sentences comprising a prayer. Yantra involves use of symbolic objects to which the Mantra is addressed. Tantra involves various ritualistic physical actions. Thus it is through Mantra-Yantra-Tantra, and through Ayurveda and Yoga that the ancient Rishis have given to mankind a unique way to attain to the true purpose of existence, which is to exist in Sat-Chit-Ananda, which is Truth-Consciousness-Bliss. The highest minds of modern science are still struggling at the border-line of the Body and Mind as we shall see in the final Chapter of this book,

CHAPTER – 7 : Zhang Zhongjing



Zhang Zhongjing

A FAMOUS FIGURE IN ANCIENT CHINESE MEDICINE

He who takes medicine and neglects to diet wastes the skill of his doctors.

--- Chinese Proverb ---

The foregoing Chapters, devoted to an overview of Ayurveda, show its unique character among the different ancient systems of medicine that have arisen in the different cultures of the world. Its uniqueness lies in going back in time to over five millennia, but remaining intact as a single discipline to the present day. It remains as an integral part of the ancient Vedic heritage, where it meshes into a vast corpus of inter-connected knowledge spanning all subjects like spirituality, religion, philosophy, linguistics, arts and sciences. Other cultures of the world have not presented a similar or comparable width or depth of knowledge. On the other hand, there is considerable evidence to show that this Indian influence could be seen to have extended to other cultures in other parts of the world. It would be interesting to examine a few other ancient systems of medicine, to examine traces of these influences, or at least, how human experience shares a considerable measure of commonality across the world's cultures. While traditions of herbal medicine and shamanistic practices are virtually universal, the most organized and advanced systems are to be found in the world's most advanced and oldest cultures in India, China and Egypt.

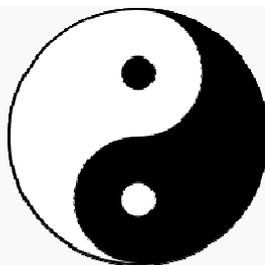
In presenting Traditional Chinese Medicine, this Chapter is named like the earlier one, after one of its father figures. Zhang Zhongjing (150—219), with the formal name Zhang Jing, was a Han Dynasty physician and one of the most eminent Chinese physicians during the later years of the Han Dynasty. He established medication principles and summed up the medicinal experience

until that time, thus making a great contribution to the development of traditional Chinese medicine. He is well known in modern Chinese medicine and considered one of the finest Chinese physicians in history. He learned medicine by studying with fellow teachers and previous medicinal literature such as Emperor's Canon of Internal Medicine and finally writing the medical masterpiece with the

translated title "*Treatise on Cold Pathogenic and Miscellaneous Diseases*". Due to his contribution to traditional Chinese medicine, he is often regarded as the sage of Chinese medicine.

Traditional Chinese Medicine (TCM) of course goes back far earlier in time than Zhang Jing. preserved as unrecorded tradition rather than as recorded history. It includes various forms of herbal medicine, acupuncture, and dietary therapy. Even with the current spread of Western medicine, these practices have gained acceptance as alternative medicine in the Western world, while these ancient forms retain a wide following throughout East Asia, and indeed account for around 40% of all health care delivered in China today. TCM does present many unique features that distinguish it from other medical traditions of the world It does show considerable similarity to, indeed influence of Ayurveda, attributable to the spread of Buddhism from India, Like Ayurveda, its concepts largely rest on the operation and effects of forces and substances both in external Nature and in the internal structures and functions of the human body that are extensively described. Ill health is attributed to the imbalance of these forces and remedies rest on the restoration of harmony of these forces through use of herbs, mineral and animal products or through external interventions like massage, acupuncture etc. A vast pharmacopeia is documented. The impacts of emotions are recognized

The concepts and practices of TCM relate to philosophical roots of Yin and Yang, which are dated to the time of the Shang dynasty (1600-1100 BC). Those concepts, in combination with what developed as the theory of Five Phases, were later merged into a larger philosophy of Taoism. Yin and Yang are concepts which are represented by the complementary white and black parts in the following symbol representing a state of balance.



YIN & YANG

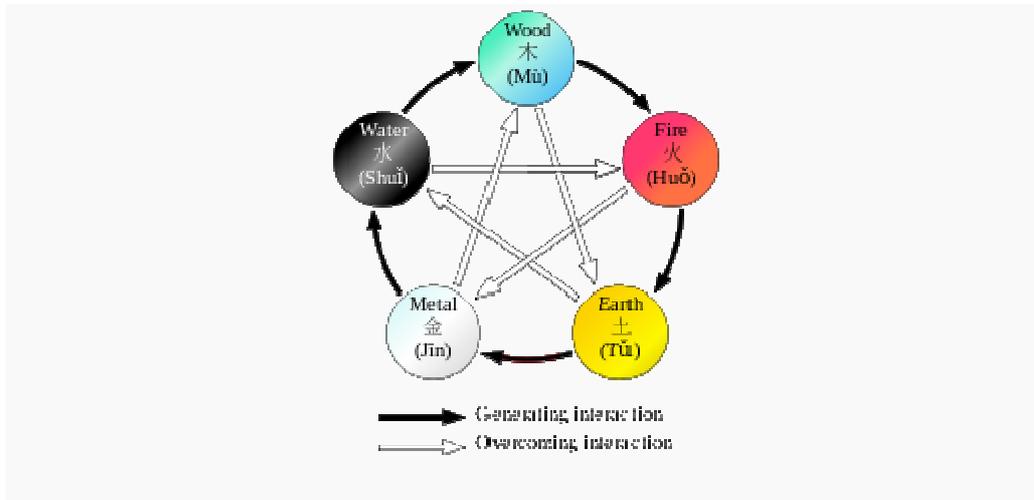
They represent two abstract and complementary aspects of every phenomenon in the universe. A common analogy of these aspects refer to the sun-facing (yang) and the shady (yin) side of a hill. Another commonly used representational

allegory of yin and yang are water and fire. In Traditional Chinese Medicine, good health is believed to be achieved by a balance between yin and yang. In the yin-yang theory, detailed attributions are made regarding the yin or yang character of things like gender, temperature, location, direction etc.

The concept of yin and yang is also applied to bodily locations, functions and disease symptoms. For example, cold and heat sensations are assumed to be yin and yang symptoms, respectively. The emphasis is on the identification of functional entities such as regulate digestion, breathing, aging etc. While health is perceived as harmonious interaction of these entities and with the outside world, disease is interpreted as a disharmony in these interactions. TCM diagnosis consists in tracing symptoms to an underlying disharmony pattern, ascertained mainly by palpating the pulse and inspecting the tongue.

The *Yellow Emperor's Inner Canon*, the oldest received work of Chinese medical theory, dates to around the first century BCE and appears to be based on texts of earlier medical lineages. The next important work is the *Treatise on Cold Damage Disorders and Miscellaneous Illnesses* was collated by Zhang Zhongjing sometime between 196 and 220 CE. It was the first medical work to combine Yinyang and the Five Phases with drug therapy. This was the earliest Chinese text to group symptoms into clinically useful "patterns" that could serve as targets for therapy. The *Canon of Problems* dating probably to the second century CE, developed a complete medical system centered on needling therapy. The *AB Canon of Acupuncture and Moxibustion*, compiled sometime between 256 and 282 CE assembled a consistent body of doctrines concerning acupuncture; while the *Canon of the Pulse* (ca. 280) presented itself as a comprehensive handbook of diagnostics and therapy.

The Five Phases Theory, also translated as the Five Elements theory, states that all phenomena of the universe and nature can be broken down into five elemental qualities as in the picture below :



The five qualities are represented by wood, fire, earth, metal, and water, with correspondence to different entities as like directions, climate, colour, taste and different organs of the body.

Strict rules to apply to the relationships between the Five Phases in terms of sequence, mutual inter-action etc. All these aspects have a great bearing on the body and in application to diagnosis and therapy. Their correspondence to and influence of the five elements of Ayurveda, Fire, Earth, Air, Water and Space, can be readily recognised.

TCM's view of the human body on body's *functions* such as digestion, breathing, temperature maintenance, which are then associated with five primary functional entities, namely Qi, Xuě, the five Zàng organs, the six Fǔ organs, and the Meridians. Each Zàng organ is paired with a Fǔ organ, and these are nourished by the Xue and Qi components through the Meridians as extensions of those functional systems.

Qi is a general purpose entity with five principal functions, namely, actuation of all physical processes in the body, especially the circulation of all body fluids; warming the body; defense against infection; containment of body fluids and preventing loss by leakage; and transformation of food, drink, and breath into Qi, Xue (blood) and jinye (“fluids”), and their inter-se transformation.

Xue refers to blood and its functions in nourishing all parts and tissues of the body, maintaining water levels and sustaining both consciousness and sleep.

Closely related to Xuě are the jinye, or body fluids like tears, sputum, saliva, gastric juice, joint fluid, sweat, urine etc. These fluids ensure nurturing and moisturizing the different structures of the body, harmonize yin and yang, and to help with the secretion of waste products. Other bodily fluids include Jingye (Semen), and 3 energies listed as Jing (essence), Qi (vital energy), and Shen (spirit),

Zàng-Fǔ is the centre piece of TCM's systematization of bodily functions. The term Zang refers to the five entities considered to be yin in nature - Heart, Liver, Spleen, Lung, Kidney -, while fǔ refers to the six yang organs - Small Intestine, Large intestine, Gallbladder, Urinary Bladder, and Stomach.

Each zàng-fǔ pair is assigned to one of five elemental qualities i.e., the Five Elements or Five Phases. The zàng-fǔ are also connected to the twelve standard meridians - each yang meridian is attached to a fǔ organ and five of the yin meridians are attached to a zàng. The meridians are believed to be channels running from the zàng-fǔ in the interior of the body to the limbs and joints, transporting qi and xuě (blood).

In general, disease is perceived as a disharmony (or imbalance) in the functions or interactions of yin, yang, qi, xuě, zàng-fǔ, meridians etc. and/or of the interaction between the human body and the environment. Therapy is based on which "pattern of disharmony" can be identified, a concept similar to the Dosha types of Ayurveda. Thus, "pattern discrimination" is the most important and difficult step in TCM diagnosis and in the practice of TCM. In order to determine which pattern is at hand, practitioners will examine things like the color and shape of the tongue, the relative strength of pulse-points, the smell of the breath, the quality of breathing or the sound of the voice.

There are three fundamental categories of disease causes : external causes: these include the Six Excesses; internal causes, namely, the "Seven Effects" sometimes also translated as "Seven Emotions, namely joy, anger, brooding, sorrow, fear, fright and grief; and finally, non-external-non-internal

causes: dietary irregularities, too much alcohol, fatigue, sexual intemperance, trauma, and parasites.

Medicines include use of dried plants, minerals and animals parts like mushrooms, dried curled snakes, turtle shell underbelly. and varieties of ginseng. There are roughly 13,000 medicinals used in China and over 100,000 medicinal recipes recorded in the ancient literature. Since TCM recognizes bear bile as a medicinal, more than 12,000 asiatic black bears are held in "bear farms", where they suffer cruel conditions while being held in tiny cages. Regarding Traditional Chinese herbal therapy, only a few trials of adequate methodology exist and its effectiveness therefore remains poorly documented.

Acupuncture is an ancient Chinese treatment that has now acquired a world-wide following. It involves insertion of needles into superficial structures of the body (skin, subcutaneous tissue, muscles) at specifically designated acupuncture points (acupoints). This procedure aims at influencing the flow of qi. According to TCM it relieves pain and treats (and prevents) various diseases. Acupuncture is often accompanied by moxibustion, a procedure which involves burning mugwort on or near the skin at an acupuncture point.

Tui na is a form of massage akin to acupressure. Oriental massage is typically administered with the patient fully clothed, without the application of grease or oils. Choreography often involves thumb presses, rubbing, percussion, and stretches.

Qigōng is a TCM system of exercise and meditation that combines regulated breathing, slow movement, and focused awareness, purportedly to cultivate and balance qi. One branch of qigong is a massage, in which the combines massage techniques with awareness of the acupuncture channels and points.

Cupping is a type of Chinese massage, consisting of placing several glass "cups" (open spheres) on the body. A match is lit and placed inside the cup and then removed before placing the cup against the skin. As the air in the cup is heated, it expands, and after placing in the skin, cools, creating lower pressure inside the cup that allows the cup to stick to the skin via suction. When combined

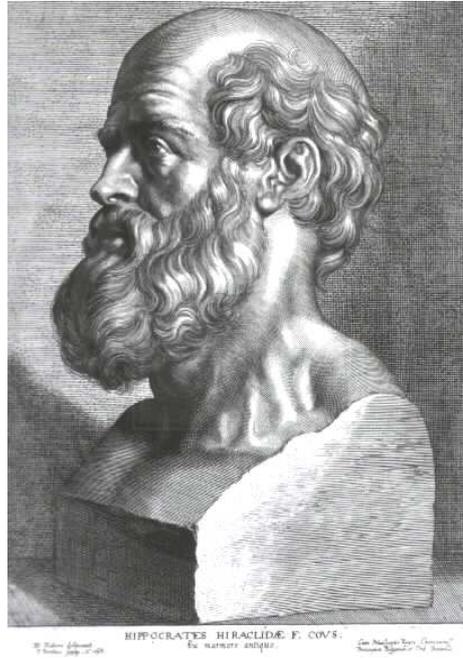
with massage oil, the cups can be slid around the back, offering "reverse-pressure massage".

Gua Sha is abrading the skin with pieces of smooth jade, bone, animal tusks or horns or smooth stones; until red spots then bruising cover the area to which it is done. It is believed that this treatment is for almost any ailment including cholera. The red spots and bruising take 3 to 10 days to heal, there is often some soreness in the area that has been treated.

Diē-dá or bone-setting is usually practiced by martial artists who know aspects of Chinese medicine that apply to the treatment of trauma and injuries such as bone fractures, sprains, and bruises. Some of these specialists may also use or recommend other disciplines of Chinese medical therapies. Such practice of bone-setting is not common in the West.

With this overview of the ancient medical tradition of China, we may now move west-wards to have a close look at the ancient roots of Western medicine as they took shape in Egypt, Greece, Rome and finally with Arab influence in Europe. To this perspective we shall now proceed in the next Chapter,

CHAPTER 8 : HIPPOCRATES



HIPPOCRATES

FATHER FIGURE OF ANCIENT WESTERN MEDICINE

This Chapter presenting Ancient Western Medicine, is named like the earlier Chapters, after one of its father figures, Hippocrates of Greece.

Ancient Vedic texts like the Manu Samhita show knowledge suggesting contact with not only peoples of all parts of India, but of more distant lands : the Chinas of China, the Pahlavas of Persia, the Shakas or Scythians of Central Asia, and the Yavanas of Greece. An astonishing range of connections, analogies and influences of Vedic concepts are to be found appearing all the way as we travel toward Westwards from India though the Middle East and Asia Minor right up to Greece and Egypt. Based on wide ranging evidence including a remarkable, path-breaking and incisive interpretation of the internal evidence of the Rig Veda, David Frawley has suggested a common

Vedic connection for these far-flung influences. He points to the extensive parallels of word and content between the Vedas and the Avesta of Persia; to references to the Vedic Gods Varuna, Mitra, Indra and the Asvins and to Sanskrit words used in ancient Mitanni - Hittite inscriptions of Asia Minor, dating back around 1350 BC; and to one of the aforesaid inscriptions recording a peace treaty between the Pharaoh Rameses-II of Egypt and the Hittite King Hattusili The Sun God and a host of religious symbols from India appear in the ancient culture of Egypt that would be contemporaneous with the Vedic times of India. The far-flung Westward connections with India of the later historical period since the time of Buddha are, of course, more extensively documented.

The ancient medicine of Egypt :

The most ancient medical tradition in the West, comparable in age, to the traditions of India and China in the East, and going back to over five millennia, is to be found in Egypt. The Egyptian tradition is unique in that it is borne out by written evidence recorded on scrolls of papyrus dating back to around 3000 BC, The tradition is also seen to be maintained by an unbroken continuity till 525 BC when Egypt was overtaken by the Persian invasion. The later invasion of Alexander the great established a more brief phase of the Greek Ptolemaic tradition, till a final phase of Arab Muslim conquest prevailed.

Till the early part of the 19th century, the earliest sources of information about ancient Egyptian medicine were Greek writings starting with Homer c.800 BC who remarked in the Odyssey : "Egyptians are more skilled in medicine more than any other art". The Greek historian Herodotus who visited Egypt around 440 BC and Pliny wrote extensively on their medicinal practices. Hippocrates (the "father of medicine"), Herophilos, Erasistratus and later Galen who studied at the temple of Amenhotep, acknowledged the contribution of ancient Egyptian medicine to Greek medicine.



Ancient Egyptian medical instruments depicted
in a Ptolemaic period inscription on the Temple of Kom Ombo.

Medical knowledge in ancient Egypt had an excellent reputation, and rulers of other empires would ask the Egyptian pharaoh to send them their best physician to treat their important people. Egyptians had a fair knowledge of human anatomy. In the mummification process, they knew how to insert a long hooked implement through a nostril, breaking bone of the brain case and remove the brain. They also must have had a general idea of the location in the body cavity of the inner organs, which they removed through a small incision in the left groin. But whether this knowledge was passed on to the practitioners of medicine is unknown. The discovery of the multilingual inscriptions in the Rosetta Stone in 1822 opened up the deciphering of the entire corpus of ancient papyrus records and uncovered a vivid picture of ancient Egyptian history in a new discipline called Egyptology. The Edwin Smith papyrus (1550 BC) disclosed use of surgical procedures.. The Hearst papyrus (1450 BC) listed 260 medical prescriptions many containing animal dung possibly carrying products of fermentation and molds, perhaps having curative properties, but also bacteria carrying infections. The

Smith Papyrus had a vague idea of a cardiac system, and y of "channels" that carried air, water and blood to the body by analogies with the River Nile; if it became blocked, crops became unhealthy and they applied this principle to the body: If a person was unwell, they would use laxatives to unblock the "channels". Mostly, the physicians' advice for staying healthy was to wash and shave the body, including under the arms, and this may have prevented infections. They also advised patients to look after their diet, and avoid foods such as raw fish or other animals considered to be unclean.

Surgery was a common practice dealing with for physical injuries. They did engage in anatomical dissections unusually on live prisoners who were made available for this purpose. They recognized three categories of injuries; treatable, contestable, and untreatable ailments. Treatable ailments the surgeons would quickly set right. Where the victim could presumably survive, then surgery would be attempted. s could be made to fix the problem with them. They used knives, hooks, drills, forceps, pincers, scales, spoons, saws and a vase with burning incense to apply heat. Circumcision of males appears to be the norm, as stated by Herodotus. Dentistry was an important field, as an independent profession it dated from the early third millennium BC, although it may not have never been prominent. The Egyptian diet was high in the content of grit from their way abrasives of grinding grain or making bread.

Magic and religion were an integral part of everyday life in ancient Egypt. Evil gods and demons were thought to be responsible for many ailments, so often the treatments involved a supernatural element, such as beginning treatment with an appeal to a deity. The healers, many of them priests of Sekhmet, often used incantations and magic as part of treatment. Amulets in general were very popular, being worn for many magical purposes.

The ancient Egyptian word for doctor is "wabau". This title has a long history. The earliest recorded physician in the world, Hesy-Ra,

practiced in ancient Egypt. He was “Chief of Dentists and Physicians” to King Djoser, who ruled in the 27th century BC.^[12] The lady Peseshet (2400 BC) may be the first recorded female doctor: she was possibly the mother of Akhethotep, and on a stela dedicated to her in his tomb she is referred to as *imy-r swnwt*, which has been translated as “Lady Overseer of the Lady Physicians” .Royalty employed their doctors and even specialists, ancient versions of . ophthalmologists, gastroenterologists, proctologists and dentists, The ancient Egyptian term for proctologist, *neru phuyt*, literally translates as "shepherd of the anus". Medical institutions, so called *Houses of Life*, are known to have been established in ancient Egypt are evidenced in inscriptions dated in the middle of the first millennium BC.

Ancient medicine in Greece :

For the next early ancient tradition of medicine we have to move from Egypt to Greece. This tradition centres around the temples dedicated to the healer-god Asclepius, corresponding to Dhanvantari, the Ayurvedic god of health. These temples known as *Asclepieia*, the best preserved instance of an Asklepieion being the one at Kos. These temples functioned as centers of medical advice, prognosis, and healing.^[16] At these shrines, patients would enter a dream-like state of induced sleep known as "enkoimesis" not unlike anesthesia, in which they either received guidance from the deity in a dream or were cured by surgery. Asclepieia provided carefully controlled spaces conducive to healing and fulfilled several of the requirements of institutions created for healing. In the Asclepieion of Epidaurus, three large marble boards dated to 350 BC preserve the names, case histories, complaints, and cures of about 70 patients who came to the temple with a problem and shed it there. Some of the surgical cures listed, such as the opening of an abdominal abscess or the removal of traumatic foreign material, are realistic enough to have taken place, but with the patient in a state of enkoimesis induced with the help of soporific substances such as opium.

The first formal Greek medical school opened in Cnidus in 700 BC. Alcmaeon, author of the first anatomical work, worked at this school, and it was here that the practice of observing patients was established. Ancient Greek medicine revolved around the theory of humours, a clear echo of the Ayurvedic three Doshas as the the fundamental determinants of health and ill-health.

A towering figure in the history of medicine was the physician, Hippocrates of Kos (ca. 460 BC – ca. 370 BC), considered the "father of modern medicine."^{[5][6]} The Hippocratic Corpus is a collection of around seventy early medical works from ancient Greece strongly associated with Hippocrates and his students. Most famously, Hippocrates invented the Hippocratic Oath for physicians, which is still relevant and in use today. The existence of the Hippocratic Oath implies that this "Hippocratic" medicine was practiced by a group of professional physicians bound (at least among themselves) by a strict ethical code.

Hippocrates and his followers were first to describe many diseases and medical conditions. He is given credit for the first description of clubbing of the fingers, an important diagnostic sign in chronic suppurative lung disease, lung cancer and cyanotic heart disease. Hippocrates categorized illnesses as acute, chronic, endemic and epidemic, and used terms such as, relapse, resolution, crisis, paroxysm, and convalescence. Hippocrates's major contributions included his descriptions of the symptomatology, physical findings, surgical treatment and prognosis. His teachings remain relevant to present-day students of pulmonary medicine and surgery.

Among later great Ancient Greek contributors was the philosopher Aristotle who was the most influential scholar from antiquity. Though his early natural philosophy work was speculative, Aristotle's later biological writings demonstrate great concern for empiricism, biological causation, and the diversity of life.

Aristotle's successor at their academy, the Lyceum, Theophrastus, wrote a series of books on botany which survived for long as the most important contribution of antiquity to botany. The biological and teleological ideas of Aristotle and Theophrastus, left a lasting impact on the subsequent course of Western medicine.

Alexandria

After Theophrastus (d.286 BC), the Lyceum failed to produce any original work. It is not until the age of Alexandria under the Ptolemies that advances in biology can be again found. The first medical teacher at Alexandria was Herophilus of Chalcedon, who connected the nervous system to motion and sensation, and also distinguished between veins and arteries, noting that the latter pulse while the former do not. Erasistratus of Chios, researched the role of veins and nerves, mapping their courses across the body. Herophilus and Erasistratus performed their experiments upon criminals given to them by their Ptolemaic kings.

Nothing of any real consequence in biology after Lucretius and Galen until the Renaissance. Through long contact with Greek culture, and their eventual conquest of Greece, the Romans absorbed many of the Greek ideas on medicine. slowly but eventually adopted a favorable view of Hippocratic medicine. This acceptance led to the spread of Greek medical theories throughout the Roman Empire, and thus a large portion of the West. The most influential Roman scholar to continue and expand on the Hippocratic tradition was Galen (AD 129–c. 200). Galen's understanding of anatomy and medicine was principally influenced by the then-current theory of humorism, as advanced by Hippocrates. His anatomical reports based mainly on dissection of monkeys and pigs, remained uncontested until 1543, when printed descriptions and illustrations of human dissections were published in the seminal work of Andreas Vesalius. Galen's theory of the physiology of the circulatory system endured until 1628, when William Harvey established that blood circulates, with the heart acting as a pump. Galen conducted many nerve ligation experiments that supported the theory, which is still

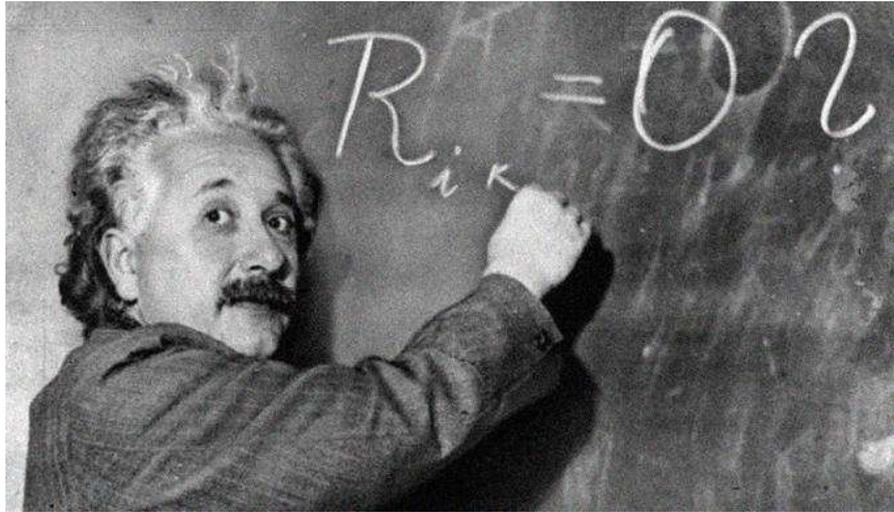
accepted today, that the brain controls all the motions of the muscles by means of the cranial and peripheral nervous systems. Galen considered himself as both as a physician and a philosopher, with a deep interest in the debate between the rationalist and empiricist medical sects. His use of direct observation, dissection and vivisection represents a complex middle ground between these two viewpoints.

Study of Hippocratic and Galenic texts, however, all but disappeared in the Latin West in the Early Middle Ages, following the collapse of the Western Roman Empire. However, the Hippocratic-Galenic tradition of Greek medicine continued to be studied and practiced in the Eastern Roman Empire (Byzantium). After 750 AD, Muslim Arabs also had Galen's works in particular translated, and thereafter assimilated the Hippocratic-Galenic tradition, eventually making some of their own expansions upon this tradition. The most influential and prolific scholar in the Arab world Abd Allāh ibn Sīnā (980,– 1037, Hamadan, Iran), better known by his Latinized name Avicenna. He was a multi-faceted scholar who wrote almost 450 treatises on a wide range of subjects, of which around 240 have survived. Including 150 on philosophy and 40 on medicine. Absorbing the entirety of the Greek and Roman tradition, he is placed in Taxila, a proximate area, and was an active area of his famous work *The Canon of Medicine*, containing a complete system of medicine according to the principles of Galen (and Hippocrates). which was a standard medical text at many medieval universities. Including the universities of Montpellier and Leuven as late as 1650. Ibn Sīnā's *Canon of Medicine* provides, Avicenna had access to the great libraries of Balkh, Khwarezm, Gorgan, Rey, Isfahan and Hamadan and these could well have known of the great centre of learning at Taxila associated with great ancient names of Ayurveda like Charaka and Jivaka.

Beginning in the late eleventh century, the Hippocratic-Galenic tradition returned to the Latin West, with a series of translations of the

Galenic and Hippocratic texts, mainly from Arabic translations but occasionally from the original Greek. In the Renaissance, more translations of Galen and Hippocrates directly from the Greek were made from newly available Byzantine manuscripts. Galen's influence was so great that even after Western Europeans started making dissections in the thirteenth century, scholars often assimilated findings into the Galenic model that should have thrown Galen's accuracy into doubt. Vesalius' anatomical texts and pictures were, however, a major improvement on Galen's anatomy. William Harvey's demonstration of blood circulation was perhaps the first real blow to Galen's inaccurate ideas about blood circulation. Nevertheless, the Hippocratic-Galenic practice of bloodletting was practiced into the 19th century, despite its ineffectiveness and extreme riskiness. The Galenic-Hippocratic tradition was only really replaced when the microscope-based studies of Louis Pasteur, Robert Koch, and others demonstrated that disease was not caused by an imbalance of the four humors, but rather by microorganisms such as bacteria.

The above survey sets the stage for the great rapid advances of Western medicine that followed, and best summarised in the Time Line set out in the Appendix. This takes us to to the advances of the 20th Century, which ushered in the new paradigm of Quantum Theory presenting a new perspective where we are beginning to see a convergence of Ayurveda and modern Western medicine. To this emerging new world view we now proceed in the next and closing Chapter of this book.



**Albert Einstein (1879-1926) who proved that
MATTER AND ENERGY ARE ONE**
His work launched a new paradigm for a new world view of Science
that required Modern Medicine to agree with Ayurveda that
MIND AND MATTER ARE ONE

The modern phase of medicine may be considered to begin with the formulation of Rene Descartes (1596-1650) the French philosopher who finally set a strict physical domain as the boundary of all Science. This is reflected in the shift in the name of Science from Natural Philosophy to Physics. His position arose from a need to steer clear of the hostility of the Roman Catholic Church which questioned any religious belief which the Church and visited it with the harsh excesses of the Inquisition. The last such exercise of this power by the Church was in 1553 when Miguel Serveto who described the circulation of blood through the lungs, was accused of heresy and burned at the stake.

This self-imposed limitation of all scientific investigation method to the domain of matter has largely continued till the present day. In recent times however, scientific investigations opened up phenomena that can no longer be explained within these limits. There are now questions of energy and the play of intelligence needing to be addressed within a new paradigm of quantum physics. The new perspectives of Biology and medical science can no longer explained in terms of physical matter but in terms of a non-material domain, specially the mind, that involves the play of energy and intelligence, a realm of thought and feeling, leading to a study of consciousness. This would lead sooner or later to the threshold of the realm of the spirit, traditionally forbidden by the Church. The limitation of the domain of matter, notwithstanding, the high points in the timeline of modern medicine set out in the Appendix certainly indicated an escalating pace of tremendous progress of knowledge in these fields. Yet all this progress has been constantly outstripped by the constant increase of the incidence and complexity of disease. The basic reason for this is that we have concentrated on physical effects on our bodies without addressing their causes, which are the mental and emotional stresses which are, in turn, caused by the thoughtless living conditions and life styles that we have been consciously creating throughout the world. Our basic problem is the dichotomy that we have created between mind and matter to the exclusion of human values and ethics.

Modernity, as a phase of human development may be considered to begin with Sir Isaac Newton (1642-1727) with his setting an explanation of all natural phenomena in his three Laws of Motion governing the behaviour of all terrestrial and heavenly bodies. This set all science in a completely materialistic framework of Nature. On the other hand it was as a philosophical formulation that Leibnitz, the famous German contemporary and rival of Newton, set his speculation on the origin of matter and all that existed as derived from a single ultimate fundamental entity, a basic form of vibrating energy,

which he called a Monad. This seemed to be an interesting philosophical anticipation of the developments of science in the 20th century, though coming several millennia after the Vedic concept of the Prana !

It is a matter of interest that the Newtonian purely materialistic world view persisted strongly to the early part of the 20th Century, when science had to come to terms with phenomena as the extreme limits of material existence at the cosmic and sub-atomic level. A new world view emerged with the great advances of science accomplished by Albert Einstein and others who pioneered the world of Quantum Physics where all forms of matter merged into a single form of energy. Here was a new world view akin to the modern concept of the Monad or ancient concept of the Prana. But we are still struggling even today, with an understanding of activities and behaviour of the human body, with an understanding as it were, of human understanding itself,

At the outset, we need to recognize all that exists are derived from and driven by energy. Einstein established that matter and energy were equivalent. Energy existed in a vast variety of forms and pervaded the entirety of space as vibrating waves characterized and measured by wavelength or frequency. Einstein discovered that photons of light could exist in dual states, either as a particle or as wave. A related finding of Louis de Broglie was the discovery that matter in the solid state was also possessed of a property of energy radiating in a wave form where its mass and wavelength had an inverse relationship. Here then was a single interchangeable relationship where matter and energy were virtually inseparable.

What implication does this finding have for our existence as human beings ? How are our bodies and faculties constructed to interact with the environment and what is the role and purpose of human life ? Let us examine how Science, specially Biology, has addressed these questions so far. The first point that must be made is that the human body is not only constructed from all the material and energy constituents of our environment, but is renewed, maintained and sustained continuously throughout its lifetime by these very constituents. The following vivid description of Deepak Chopra tells us how much we share with the external world and all that exists in it, living or otherwise :

“ in the last three weeks, a quadrillion atoms have circulated through our bodies that have circulated through the bodies of every other living species on the planet In less than one year, we replace ninety-eight percent of our physical bodies. So, literally, we make a new liver every six weeks at the atomic level. A new skin once a month. A new stomach lining every five days. A new skeleton we replace it every three months.....”.

My body ? Which body are you talking about, asks Dr Chopra in a rhetorical question. Let us now look more closely at what modern science has uncovered about the human body. The basic building block of the body is the cell and it is estimated that the body is constituted of around 50 trillion cells, an estimate that shows a widely debated range of variation. These are distributed among and support the functions of various organs of the body like the brain, heart, lungs, stomach, etc and all other specialized glands. The cell is basically like a bag enclosed in a membrane, with a core comprised of the DNA molecule which holds the life and functions of the cell. Incidentally the DNA shares a lot of commonality of structure and function across all living species. The cell can split to renew and replicate itself and is also a self-contained factory that can produce any or the chemical components needed for the maintenance and functioning of all the organs of the body. The redundant waste products of all the processes of the body are eliminated by its excretory organs.

The brain which has an overall coordinating role in all activities, particularly receiving input signals from all the sensory organs in all interactions with the environment, and directing all output activities like speech and all motor activities. The brain has its own awesome number of cells called neurons. What is interesting is that the neurons and the cells of the entire body are linked in a vast meshed network capable of body-wide instant communication with electrical and chemical signals. These signals indicate the occurrence of any problem, disease condition or malfunction in any part of the body. The signals and therapeutic responses to them are communicated across the body by mechanisms called neurotransmitters and receptors on the surface of the cells. Therapeutic responses

in form of chemicals called peptides are manufactured and made available by the DNA of appropriate cells in every part of the body. Thus the body is completely self-sufficient with exact preventive or therapeutic remedies being made available instantaneously in precise dosages and precisely at the places that they are needed. Externally administered remedies use these internal mechanisms to reach the cell receptors through the blood stream, with the drawback that they are costly, time-consuming and often have undesirable side effects over which we have no control.

Latest researches have made considerable further advances beyond the above developments, towards an understanding of the above internal bodily processes. These processes however are still being largely explained within the physical realm of physics, chemistry and biology in continuing and persisting loyalty to the classical materialistic Newtonian world view of Science. This is where we are beginning to see the inroads of the new perspectives of Quantum Physics. And it is here we are beginning to see that while the structure and function of the brain may be set and explained within this materialistic realm, the Mind that controls the brain, extends far beyond into a vast non-material realm. Quantum theory presents all phenomena as a relationship between all that exists even transcending form, space and time, yet amenable to observation and human response. We may explain this with a simple example of a Compact Disk which contains the record of a movie. Physically its content is no more than a vast assemblage of static magnetic dots. Nevertheless, a CD Player transforms all these dots into a presentation of images, sounds and information, woven into a vivid life-like experience. The world around us may similarly be likened a place where a vast interplay of multimedia energies is occurring all the time, which are received by our sensory organs as resonating patterns. These patterns are stored as electronic memory dots in the brain substance as a holographic image. These dots are then transformed as living images in a 3D context of space and time, as our perceived experience.

The great advances of modern electronic instrumentation – the ECG, EEG, PET, NMR etc - have contributed enormously to provide recorded images corresponding to what is happening in the brain and body during its various activities as controlled by the mind. Phenomena like control of the respiration rate, the heartbeat, blood pressure, body temperature etc by meditation and other Yogic exercises, or communication of thought over long distances, have been extensively authenticated by observation and documentation in scientific experiments. These developments have reached a point where Mind-Body Medicine has emerged as a recognized new discipline of medical science, indeed as a broad people's movement with a large following across the world. This discipline recognizes the basic critical role of the Mind's control over the body, on which Ayurveda and Yoga are founded.

A vast amount far-reaching research has been taking place to understand the deeper mechanisms and operations of the brain and its possible relationship with the Mind. The ground-breaking research of Dr. Candace Pert in the National Institute of Health in the USA, led to the discovery of a large number of structures called neurotransmitters and receptors on the surface the neurons of the brain, What was surprising was that the structures were found in cells of all organs of body. These structures thus constituted a body-wide communication network capable of instantaneous exchange of messages indicating not only a health problem but also resulting in generation in a precise remedy by the cells of the affected organ. Dr.Pert describes a process where the non-material thoughts and feelings of the Mind can create all such chemical responses in the material structures of the brain and body, that have a direct bearing on physical, mental and emotional health. Her findings are set out in a fascinating book entitled "Molecules of Emotion", a title that expresses so directly and beautifully, the bridge between Mind and Matter. "

It would be interesting to see how these developments in modern medicine rooted in the Newtonian materialistic world view of modern science are moving slowly and inexorably towards the role and impact of the mind on the health of the body as presented in Ayurveda and Yoga. One of the most perceptive discussions of these questions is to be found in the book "The Universe in a Single Atom", by His Holiness, the Dalai Lama. The Dalai Lama speaks from a Buddhist perspective which, of course, is closely rooted on the older Vedic tradition. Here are some thought provoking extracts from this book that should start us to concentrate on finally bridging this narrowing gap between ancient and modern medicine.

“.....For me, science is first and foremost an empirical discipline that provides humanity with a powerful access to understanding the nature of the physical and living world. Science proceeds by a very specific method that involves measurement, quantification and inter-subjective verification through repeatable experiments. This, at least, is the nature of scientific method within the current paradigm. Within this model, many aspects of human existence , including values, creativity and spirituality, as well as deeper metaphysical questions , lie outside the scope of scientific enquiry.....”

“.....Scientific materialism clearly cannot claim to be a true science because it sets matter as the boundary for all truth. The findings of sub-atomic physics today tell us of a state of uncertainty of whether matter exists as a particle of matter or presents itself as a wave of energy, which is not matter in the sense in which we understand it. Scientific materialism itself thus becomes a self-contradiction. The investigative approach of Science would seem to unfold truth in installments over time, never with any sense of finality. Nothing illustrates this better than the fact that in 1906 J.J.Thomson won the Nobel Prize for discovering the electron as a particle, while in 1937 his son George Thomson won the same prize for demonstrating that the electron was a wave.....”

The objective investigative approach is thus seen to be limited by the physical constraints of its instrumentation. These instruments at best provide partial images of an unfolding of a partial reality. Even here, ultimately, whatever is so unfolded has to be interpreted and understood by the inner faculties of the mind. We may now contrast this with the subjective investigative approach of the ancient Vedic tradition where investigation and understanding of results are handled entirely by the inner faculties of the mind. Data is brought by the sensory organs from the external world, but is also generated by the inner faculties, which include thought, reason, intellect, intuition and instinct. The Vedic understanding rests on the power, reach and sophistication of all the inner faculties which do not suffer any of the constraints or limitations of external physical instrumentations of Science. The Vedic methodology addresses both internal and external experience as a vast single continuum without any of the gaps introduced by the reductionist approaches of investigations of Science or the limitations of its instrumentation. By freeing itself from its self-imposed limitations, if modern medicine can finally bridge the gap between Mind and Body, it may lead Man to his higher, destiny, an ultimate destiny that is spiritual.

The emerging position of Science today is admirably summed up by Dr. Karl Pribram, one the foremost authorities in the USA, on the brain in the following words :

“..... The scientific and esoteric traditions have been clearly at odds since the time of Galileo.- Each new scientific discovery and the theory developed from it has up until now resulted in the widening of the rift between objective science and the subjective spiritual aspects of man’s nature.... The discoveries of the twentieth century science do not fit this mold. For once the recent findings of science and the spiritual experiences of mankind are consonant. This augurs well for the new millennium --- a science that comes to terms with the spiritual nature of mankind may well outstrip the technical science of the immediate past in its contribution to human welfare....

APPENDIX

Time line of progress of the modern medicine since the 16th century

1518 - College of Physicians founded now known as Royal College of Physicians of London is a British professional body of doctors of general medicine and its subspecialties. It received the royal charter in 1518

1628 – William Harvey explains the circulatory system

1736 – Claudius Aymand performs the first successful appendectomy

1747 – James Lind discovers that citrus fruits prevent scurvy

1774 – Joseph Priestley discovers nitrous oxide, nitric oxide, ammonia, hydrogen chloride and oxygen

1790 – Samuel Hahnemann rages against the prevalent practice of bloodletting as a universal cure and founds homeopathy.

1796 – Edward Jenner develops a smallpox vaccination method.

1800 – Humphry Davy announces the anaesthetic properties of nitrous oxide.

1816 – Rene Laennec invents the stethoscope.

1818 – James Blundell performs the first successful human blood transfusion.

1842 – Crawford Long performs the first surgical operation using anaesthesia with ether.

1846 – First painless surgery with general anaesthetic.

1849 – Elizabeth Blackwell is the first woman to gain a medical degree.

1867 – Lister publishes *Antiseptic Principle of the Practice of Surgery*, based partly on Pasteur's work.

1870 – Louis Pasteur and Robert Koch establish the germ theory of disease.

1881 – Louis Pasteur develops an anthrax vaccine.

1882 – Louis Pasteur develops a rabies vaccine.

1890 – Emil von Behring discovers antitoxins and uses them to develop tetanus and diphtheria vaccines.

1895 – Wilhelm Conrad Röntgen discovers medical use of X-rays in medical imaging.

1897 – Asprin is invented in Germany.

1901 – Karl Landsteiner discovers the existence of different human blood types.

1901 – Alois Alzheimer identifies the first case of what becomes known as Alzheimer's disease.

1903 - Willem Einthoven discovers electrocardiography (ECG/EKG).

1906 – Frederick Hopkins suggests the existence of vitamins and suggests that a lack of vitamins causes scurvy and rickets.

1907 – Paul Ehrlich develops a chemotherapeutic cure for sleeping sickness.

1910 - Hans Christian Jacobaeus performs the first laparoscopy on humans.

1917 – Julius Wagner-Jauregg discovers the malarial fever shock therapy for general paresis of the insane.

1921 – Edward Mellanby discovers vitamin D and shows that its absence causes rickets.

1921 – Frederick Banting and Charles Best discover insulin – important for the treatment of diabetes.

1921 – Fidel Pagés pioneers epidural anesthesia.

1923 – First vaccine for Diphtheria.

1926 – First vaccine for Pertussis,

1927 – First vaccine for Tuberculosis.

1927 – First vaccine for Tetanus.

1928 – Alexander Fleming discovers penicillin.

1929 – Hans Berger discovers human electroencephalography.

1932 – Gerhard Domagk develops a chemotherapeutic cure for streptococcus.

1933 – Manfred Sakel discovers insulin shock therapy.

1935 – Ladislav J. Meduna discovers metrazol shock therapy.

1935 – First vaccine for Yellow Fever.

1936 – Egas Moniz discovers prefrontal lobotomy for treating mental diseases; Enrique Finochietto develops the now ubiquitous self-retaining thoracic retractor.

1938 – Ugo Cerletti and Lucio Bini discover electroconvulsive therapy.

1943 – Willem J Kolff build the first dialysis machine.

1944 - Disposable Catheter - David Sheridan.

1946 - Chemotherapy - Alfred G. Gilman and Louis S. Goodman.

1947 - Defibrillator - Claude Beck.

1948 - Acetaminophen - Julius Axelrod, Bernard Brodie.

1949 – First implant of intraocular lens, by Sir Harold Ridley.

1949 - mechanical assistor for anesthesia - John Emerson.

1952 – Jonas Salk develops the first polio vaccine.

1952 - Cloning - Robert Briggs & Thomas King.

1953 - Heart-Lung Machine - Dr John Heysham Gibbon.

1953 - Medical Ultrasonography - Inge Edler.

1954 - Joseph Murray performs the first human kidney transplant.

1954 - Ventouse - Tage Malmstrom.

1955 - Tetracycline - Lloyd Conover.

1956 - Metered Dose Inhaler - 3M.

1956 - Synthetic Blood - Thomas Chan.

1957 – William Grey Walter invents the brain EEG topography (toposcope).

1958 - Pacemaker - Rune Elmqvist.

1959 - In Vitro Fertilization - Min Chueh Chang.

1960 – Invention of Cardiopulmonary resuscitation (CPR).

1960 – First combined oral contraceptive approved by the FDA.

1962 - Hip Replacement - John Charnley.

1962 - Beta Blocker James W. Black.

1962 – First Oral Polio Vaccine (Sabin).

1963 - Artificial Heart - Paul Winchell.

1963 - Thomas Starzl performs the first human liver transplant.

1963 - James Hardy performs the first human lung transplant.

1963 - Valium (diazepam) - Leo H Sternbach.

1964 – First vaccine for Measles.

1965 – Frank Pantridge installs the first portable defibrillator,

1965 - Rubella Vaccine - Harry Martin Meyer.

1965 – First commercial ultrasound.

1966 - C. Walton Lillehei performs the first human pancreas transplant.

1967 – First vaccine for Mumps.

1967 – Christiaan Barnard performs the first human heart transplant.

1968 - Powered Prosthesis - Samuel Alderson.

1968 - Controlled Drug Delivery - Alejandro Zaffaron.

1969 - Internet - Advanced Research Project Agency (ARPA).

1969 - Balloon Catheter - Thomas Fogarty.

1969 - Cochlear Implant - William House.

1970 – First vaccine for Rubella.

1970 - Cyclosporine, the first effective immunosuppressive drug is introduced in organ transplant practice.

1971 - Genetically Modified Organisms - Ananda Chakrabarty.

1971 - Magnetic Resonance Imaging - Raymond Vahan Damadian.

1971 - Computed Tomography (CT or CAT Scan) - Godfrey Hounsfield.

1971 - Transdermal Patches - Alejandro Zaffaroni.

1971 – Sir Godfrey Hounsfield invents the first commercial CT scanner. 1972 - Insulin Pump - Dean Kamen.

1973 - Laser Eye Surgery (LASIK) - Mani Lal Bhaumik.

1974 - Liposuction - Giorgio Fischer.

1976 – First commercial PET scanner.

1978 – Last fatal case of smallpox.

1979 Antiviral Drugs - George Hitchings & Gertrude Elion.

1980 – Raymond Damadian builds first commercial MRI scanner.

1980 - Lithotripter - Dornier Research Group.

1980 – First vaccine for Hepatitis B - Dr Baruch Samuel Blumberg.

1981 - Artificial Skin - John F. Burke & Ioannis V Yannas.

1981 - Bruce Reitz performs the first human heart-lung combined transplant.

1982 - Humulin insulin - Eli Lilly.

Interferon Cloning - Dr Sidney Pestika.

1985 - Automated DNA Sequencer - Leroy Hood & Lloyd Smith.

1985 - Polymerase Chain Reaction (PCR) - Kaery Mullis.

1985 - Surgical Robot - Dr Yik San Kwoh.

1985 - DNA Fingerprinting - Alec Jeffreys.

1985 - Capsule Endoscopy - Tarun Mullick.

1986 - Fluoxetine HCl - Eli Lilly and Co.

1987 – Ben Carson, leading a 70-member medical team in Germany, was the first to separate occipital craniopagus twins.

1987 - Statins - Merck & Co.

1987 - Tissue Engineering - Joseph Vacanti & Robert Langer.

1988 - Intravascular Stent - Julio Palmaz.

1988 - Laser Cataract Surgery - Dr Patricia Bath.

1989 - Pre-implantation Genetic Diagnosis (PGD) - Alan Handyside.

1989 - DNA Microarray - Stephen Fodor.

1989 - World Wide Web WWW - Tim Berners-Lee.

1990 - Gamow Bag ® - Dr Igor Gamow.

1992 – First vaccine for Hepatitis A available.

**1992 - Electroactive Polymer (Artificial Muscle) - SRI International. **

1992 - Intracytoplasmic Sperm Injection (ICSI) - Andre van Steirteghem.

1998 - Stem Cell Therapy - James Thomson.

26 June 2000 - Human Genome draft completed.

2001 Telesurgery - Jacques Marescaux.

2001 Artificial liver - Kenneth Matsumura.

2001 Self-Healing Materials - Scott White.

2002 Chitosan Bandages by HemCon.

2003 – Carlo Urbani, of Doctors without Borders alerted the World Health Organization to the threat of the SARS virus, triggering the most effective response to an epidemic in history. Urbani succumbs to the disease himself in less than a month.

2005 – Jean-Michel Dubernard performs the first partial face transplant.

2006 – First HPV vaccine approved.

2006 – Second rotavirus vaccine approved (first was withdrawn).

2007 - Visual prosthetic (bionic eye) Argus II.

2008 – Laurent Lantieri performs the first full face transplant



**An artist's representation of
Susruta performing a surgery**

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