

**NEUROPHYSIOLOGICAL
BASIS OF RAJA YOGA IN THE
LIGHT OF SAHAJ MARG**

Our conscious thought and will is a very Small fragment of the vast fund of consciousness. This vast fund lies dormant within us and one object of Yoga is to actualise this fund and harness it to our life activities.

RAM CHANDRA

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INSTITUTE

NEUROPHYSIOLOGICAL BASIS OF RAJA YOGA IN THE
LIGHT OF SAHAJ MARG

By

V. SRI RAMACHANDRA MURTHY.

B Sc (Hons), M.Sc., Ph D.,

Director, Sahaj Marg Research Institute;

Department of Zoology,

SRI VENKATESWARA UNIVERSITY

TIRUPATI-517 502 (A.P.)



Published by

SHRI RAM CHANDRA MISSION

(Shahjahanpur, U. P. 242 001, India)

First Edition, April, 1979-1500 copies

Publishers
Publication Department
SHRI RAM CHANDRA MISSION
Shahjahanpur (U.P.) 242 001
India

Printed by G.S. Press, Madras-600004

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Dedicated to:
Shri Ram Chandraj
President
Shri Ram Chandra Mission
Shahjahanpur (U. P.) 242001

PREFACE

It was on an early winter evening in a remote corner of Uttar Pradesh, India, that I received a specific command from my spiritual Guru, Shri Ram Chandraji, founder President of Shri Ram Chandra Mission, Shahjahanpur, U.P. that I should start thinking of interpreting the age old Adhyatmik Vidya (Psychic learning) as propounded by Raja Yoga, in terms of the present and modern scientific advancement attained by contemporary society. Having realized the immensity of the task and the shortcomings on my part I surrendered myself to the will of the Great Master and looked up to him for guidance.

It is not uncommon for an ordinary man of the world, and more so for a recluse in quest of yoga, to wonder in awe at the great technological achievements that science has recorded at the present juncture and enquire into the very basis and working of science. The advanced and more sophisticated of all the scientific personnel among the intellectuals have had innumerable opportunities to suspect, if not be convinced of, an all-pervading universal force, and to speculate about the meaning and purpose of life. Each one in his turn has asked what is this science and where does this obtain and what is this universal force, and how to channelise it or in short what is science and what is yoga?

A glance at the history of human evolution more particularly at the human thought would readily indicate, as vouchsafed by eminent and great scholars of all times, that these two enquiries tend to merge into one. Matter becomes the subject matter of scientific enquiry while spirit becomes the object of yoga. Matter and spirit coexist and are two facets of the same one Being, the gross expressing in terms of empiricism while the other is the subtler form of its existence.

Accordingly, the physical, the chemical and other qualities of matter form the domain of science which is obvious to our perception and can, under given conditions, be tested, verified and established beyond doubt as a fact, and hence the pursuit is based on the logic and very rationale

of the things. But when enquiries regarding spirit are taken up one necessarily treads on slippery ground owing to the very nature of the enquiry. The limitation is a part of the observer and not of the observed. The enquiry has to proceed on entirely different lines for which an ordinary person is quite unsuited or unprepared. A time has come, in order to bring about a better understanding, when each one has to interpret his basic tenets to the other in an easy, lucid and more purposeful manner. Being acquainted with these fields of enquiries the author, though quite aware that he is a specialist of neither this nor the other branch, has taken up the task for preparing the ground for the future since he has neither the extraordinary capacity for the stupendous task of interpreting science in all its multidimensional aspect to a man in quest of spirit shall we call him a yogi nor does he dare think of confronting a scientist with spirit.

Yet for what it is worth an attempt is made with a sincere intention of carrying out the wish of my Master and to pave the way for a well-equipped person to discharge this onerous duty of bringing the yogi and the modern scientist together into better harmony. It would not be out of place to mention that all the mistakes are mine while any points of worth are His. Praise Him and curse me is the attitude with which I faced the elite of Sitapur (U.P.) who readily agreed to receive my talk on "The scientific basis of Raja Yoga in the light of Sahaj Marg" and have given me their assent and this has emboldened me to claim your time and attention.

I am extremely thankful to the following gentle-men for going through the manuscript critically and offering valuable suggestions: Sri K. C. Narayana. M. A., M A. (Hons) of Directorate of Employment, Government of Andhra Pradesh, Hyderabad; Dr. K.C. Aravinda Rajagopal. M.A., Ph. D.; Prof. V. Panduranga Rao, B. V.Sc. , M.S. , formerly of Veterinary College, Tirupati; Prof. K.S. Swami, M.A., Ph D. and Dr. T. Krishna Rao, M. A., Ph D. of Sri Venkateswara University Colleges of Science and Arts, Tirupati. I am indebted to a large number of my associates especially Dr. G. Kuppuswamy, Preceptor-in-charge, Shri Ram Chandra Mission's Branch, Tirupati; Sri G. Subrahmanyam Reddy, S.V. Arts College, Tirupati; Sri N.S.R Anjaneyulu of Jawahar Bharati, Kavali; and my wife Smt. V.L.P. Sunday for their keen interest and

constant encouragement without which this work would not have materialized.

Tirupati

30-4-78

V.S.R. MURTHY

FOREWORD

Man's eternal quest for happiness and peace has found expression in many forms. In the modern world, where stresses and tensions have increased considerably, such happiness and peace are difficult to achieve. The Ancients in our country have pondered deeply over this problem and have indicated some paths that one may follow to reach the state of Bliss. Attempts to attain this state of Bliss do not imply a negation of involvement in worldly affairs nor a refusal to do one's best for the welfare of humanity. By attaining a state of tranquillity and unimpaired efficiency, our usefulness to mankind increases many folds.

Many methods are available to attain this goal, some easy and some difficult. In this exposition, Dr. Sri Ramachandra Murthy has set down in clear and simple terms, the methodology of Raja Yoga in the light of Sahaj Marg and based it on sound neurophysiological data.

Though the present state of our knowledge of the nervous system and the brain is far from complete, we know now enough to explain scientifically on a satisfactory basis the various phenomena occurring during the yogic state. In the first half of the book Dr. Sri Ramachandra Murthy has explained the structure and the function of the brain and the nervous system and in the second half of the book, he has set forth the objectives and the methodology of Raja Yoga based on the philosophy of Sahaj Marg. He has interwoven the development of human personality with cosmic evolution and has taken pains to stress that the path pointed out in Sahaj Marg is easy to follow and sure of results. I am sure a study of this book will be of great value to all those who are keen on improving efficiency and attaining tranquillity and finally achieving the ultimate Bliss.

B. RAMAMURTHI

Neurosurgeon, and

Head of the Department of

Neurosurgery, V.H.S. Medical Centre,

Madras-600 020.

Madras

28-7-1978

PART ONE

HUMAN EXISTENCE AND TENSIONS

Palaeontological evidence indicates that the humanoid stock, after a long history of evolution stretching over several millennia, resulted in the descent of the modern man known as Homo sapiens (meaning man the wise). The fact that all men are wise is taken for granted though it may not be true in each and every case. However, the potentialities are there in the human system. One has to acquire this status during the earlier period of his life by undergoing a sort of training or education. For one to be wise he has to acquire wisdom or knowledge from the environment by way of confrontation with it, and this is augmented by the processes of learning, storing away the experiences as memory, etc. All this in its turn is linked up with the thought processes that incessantly and constantly besiege the human brain.

If man has attained supremacy over time and space it is not because of his acquisition of certain unique traits during the course of his evolution such as, for example, the opposable thumb, stereoscopic vision or the his upright plantigrade gait, giving him posture. Though each trait in its turn has been responsible for bringing about a radical change in his functional ability, yet, none of these things by themselves can be considered as responsible for the special status of man. The only sovereign thing about man giving him his supreme position in Nature is his thought. The thought processes may once again be either specific and concrete or may take the route of non-specific and abstract. There is nothing that can be said as unfamiliar so far as the thoughts are concerned. They are too familiar and very common. Every brain has to produce thoughts and it cannot normally be otherwise. But then how and in what form are these thoughts produced? What is the nature and above all the language of these thoughts? Can one economise on the production of all these sundry thoughts, or can we channelise our thought processes? Can we train our brains to stop thinking at least for short periods and try to experience what happens during that time?

A host of men - philosophers, logicians, psychologists, scientists, particularly biologists – of the highest intellectual acumen and achievements of their times have pondered over participated in the grandest debate of all times extended over centuries, nay millennia, regarding the mystery of life. The analytic or reductionistic method will enable us to subdivide the living space or Biosphere into the component units of descending complexity. Biosphere can be divided into the constituent Biocycles, Biochores, Biotopes, Populations and Organisms. The organisms constitute Organ systems, Organs, Tissues and Cells. The subcellular components of descending complexity are nucleus, chromosomes, genes, molecules, and finally atoms while the atoms further constitute particles of complex nature and properties. The study of life or living system at all these levels provides a lot of empirical data and information about the structure, function and material constitution of the organisms or living systems.

Extra biological extension of these organizations would enable one to recognize



that the Biosphere, approximately corresponding to this planet Mother Earth in its dimensions, forms an integral part of the solar system which is a constituent part of the galaxy which along with several millions of other galaxies forms the universe. Several such universes go to make up the creation or the cosmos at large. Of all these levels of organizations some like 1. Universe, 2. Galaxy, 3. Solar system, 4. Biosphere, 5. Biocycle, 6. Biotope, 7. Population consisting of organisms, 8. Organs, 9. Cells, 10. Nucleus, 11. Chromosomes, 12. Genes consisting of D.N.A. molecules and 13. Atoms consisting of the 14 ultimate particles like electrons may be regarded as representing a parallel to the ancient Hindu concept of fourteen worlds (Chaturdasa Bhuvana), on other. Thus organisms, especially the highly evolved of them all, the man, who happens to be, paradoxically enough, discharging a dual function of the observer and the observed simultaneously, occupies a central position linking up the ultimate particles of matter on the one hand and the cosmos on the other. The modern concept of cosmos and the ultimate particle being one and the same, obeying the eternal and fundamental laws equally, save for the magnitude of dimensions, has been envisaged by the ancient seers of India who have propounded the dictum of Yatha Brahmande Tatha Pinde (As in the Macrocosm so in the Microcosm)".

The place of living things and their role and significance has been a bone of contention of a very fundamental nature since time immemorial, as something new and unique and quite different phenomena from the constituent level emerges out at every biological and extrabiological level of organisation. Several questions have been raised and answered differently at different times.

It is maintained by some that all living creatures are just physicochemical mechanisms capable of exhibiting all the three fundamental manifestations like self-maintenance, self-reproduction and the adaptive self-regulation. These things happen only on a grand scale, in the case of human beings, thanks to their intellect and rationality. They come into being, grow and live for periods of time and die sooner or later. Man serves no purpose by living and when he dies it makes no difference to the universe. It makes no difference whether he is or is not. There is nothing more to the episode of life'. The matter formulates and comes into existence in the form of a machine that too a grand one with all the

complexities and when the mechanism wears out the man ceases to live. According to this view all life, including man's with all its glory and attainments is no better and no different from a bag of fertilizer which of course he is. This in short is the mechanistic view point that treats all life including human in terms of physico-chemical principles since it is manifest only in physical matter that can be explained in terms of the physical and chemical laws of matter. This mechanistic philosophy of life had its origin in the teachings of Democritus and became popular during the Seventeenth century, and remained as the foundation of Natural science until the turn of the present century.

The explanations of the living processes given by mechanistic view were stressed as inadequate by Aristotle. He proposed a Dualistic solution of the mind and body or a vitalistic philosophy which continued to be popular even down to the Middle Ages till the onset of the mechanistic view point in the 17th Century. Others, while accepting along with Aristotle the material aspect of all life and more so the human existence, added that this machine that is man is run by an immaterial force or a purposive agent that is jokingly called the 'ghost in the machine' or a vital principle, or spirit, supermaterial agent, or a guiding principle that is known as elan vital or entelechy or a soul which, when leaving the body causes the death of the man, and that one has to strive for the improvement not of the physical body but of this subtle principle or soul in the body throughout all his life. The believers of the existence of a spirit in the matter of the human body hold that man has to strive to uphold the higher values in life and attain to the principle of Eternity that is beyond space and time. Some have even gone to the extent of saying that this human life on earth is only a preparation for the attainment of life after life, or life after death.

Each theory has criticism against it. The vitalistic view point also has been abandoned and relegated to the realm of metaphysics. Currently, Natural science advocates the organismic view point, which holds that the crux of the organism is in the interplay and control that exists in the parts and between the parts and the totality of the organism. Science concerns only with matter and all its applications can be successful only with matter. The proof of the existence of the subtle principle or soul has been beyond the assiduous seeking of empirically established facts of scientific endeavour.

The recent tendency on the part of a section of demographers, philosophers and certain top-ranking scientists and especially the environment biologists to express grave concern about the future of the human race, advocating the 'Dooms-Day hypothesis' makes one very much alarmed about the impact of the present civilization and its hazards to the human race. At the other extreme, equally vehement are the voices of a large number of people especially the high priests of several religions and scientists who have happily heralded the advent of an entirely different civilization, i.e., that of a superman wherein the evils of the present civilisation will disappear and a better meaning and purpose of life will be realized.

The Second Law of Thermodynamics holds that all Natural processes shift from orderliness to chaos and this tendency is countered in and by the living systems wherein out of seeming chaos and confusion an ascending series of complex organizations that finally result in the formation of an organism have been constructed. The life processes have been considered to exhibit an innate goal-seeking or unidirectional movement during the course of organic evolution which is based on the theme of variability, and assisted all along by the process of natural selection during the struggle for existence of the organisms. These directional trends or orthogenetic trends of evolution which are teleological in nature have been viewed in terms of the Second Law of Thermodynamics which has been aptly called as the "Time's Arrow" for purposes of explaining the course of evolution. This Time's Arrow indicates the direction of events in time, but does not point when and how fast these events occur. It is not possible to infer anything meaningful about the possibility of a 'Doom or Boom' in the cultural evolution of the human race despite several attempts to make some sort of guess. Nor is there any indication, if and when the super human race were to populate this Mother Earth to say whether the evolution would follow the line of cultural advancement leading to the acquisition of new patterns of social life, or would it follow the course of biological progress involving the acquisition of new and unique traits in the physical frame of the human body.

Advanced countries have been boasting about the freedom of man from the vicissitudes of Nature, thanks to the unprecedented progress on the material front owing to the advancement of technology. The fantastic speeds of the travelling crafts have narrowed down the horizons of space and time to the level of comprehension of the human mind and this has been responsible for the gearing-up processes which might accelerate or may even hinder the progress of the human race towards the ideal of superman.

However, a more dispassionate view about the present position of the human race would reveal that the progress achieved on the material plane of his existence is just not sufficient to outweigh the degeneracy experienced by the race on other planes of existence. The recent happenings involving political, social and economic upheavals together with the attendant contemporary society of almost every continent is sufficient to point out and bring home the obvious fact that all is not quite well with the race as was thought of at one time. To put it in other words we have people among us who have conquered outer space, and are even contemplating seriously the conquest of other planets. Thus, man has commenced meddling with cosmic forces by gradually extending the frontiers of his activity to the interplanetary systems, instead of confining it to this planet as was the case since the dawn of civilization. At the same time, it is a matter of deep regret that there is also another set of people who just cannot think of going to bed in the night for fear of a restless, sleepless and tortuous night. Several persons are subjected to such emotional imbalances, stresses or tensions at one time or other if not all the time. At present tension seems to be so common as to be regarded as a synonym of modern man, or in Shakespearian language 'Tension, thy name is Man'.

Ever so many marvels such as the conquest of space, transplantation of hearts, breaking the genetic code, splitting the atom, unravelling Endocrine and neural mechanisms, invention of computers, etc., etc., have been performed by man, but alas some cannot sleep naturally and soundly in peace for a single night. Some people have no need for peace and they can apparently work normally when strung up like a wire with all sorts of tensions, and some argue that the best qualities of man are out only when he is quite under tension. But the masses at

large crave for that restful, blissful and invigorating peace and avoidance of all worries and consequent tensions. Most of the people experience physiological or psychological tensions due to their desire to flourish well in this competitive society which is characterised, at present, by degenerative trends so far as moral, ethical, social and religious practices are concerned. Is this monotonous and vexatious repetition of untold miseries resulting” in emotional imbalance and consequent imbalance in the lives of one and all a biological necessity? What is the purpose achieved by this significant and universal theme of life’s drama? How can one get rid of or ease his tensions? Do we have to work singly and individually or collectively and as a whole? These are some of the questions that have plagued the best of the brains of the times and have been answered variously from time to time during the evolution of human society.

Human tensions or stresses are described as consisting of a stressor which results in an internal stress reaction exhibiting finally in the form of stress behaviour. Stressful experience leads to both physiological and psychological disturbances. A stressful external situation in life, like conflicting relations (interpersonal and social), or losses due to ill health, or bereavement, or failure in profession constitutes a stressor, To this external cause the internal stress response is elicited which may be in the form of anxiety, guilt, anger, sadness or depression, involving an emotional conflict. This internal response may again manifest in the form of observable stressful behaviour. The behaviour may take the realistic action pertinent. To the stressor or in its absence it leads to inappropriate behaviour of multiple nature and pattern such as uncontrolled aggressive or sexual behaviour, delinquency, addiction, compulsive overeating, psychiatric illness including anxiety, hysteria, suicidal or homicidal tendencies, or any of the psychosomatic reactions like enuresis, diarrhoea, vomiting, psychogenic pain the development, aggravation or relapses of organic diseases like bronchial asthma, dermatitis, duodenal ulcer, colitis, etc. Different types of stress responses in the same individual may reflect at different times in the form of apparently disconnected and independent diseases.

In neurophysiological terms, stressful events can influence Limbic system and Reticular formation and these in their turn alter the

physiological function of the peripheral organs, through their control the Hypothalamus and Pituitary while simultaneously giving rise to cognitive experience owing to the connection between the, higher cortical centres with Limbic system and Reticular formation.

During conditions of stress many physiological changes such as the dilation of pupils, raising of hair, increased sweating, increased blood flow to the muscles, increased rate of heart beat accompanied by a rise in blood pressure and blood sugar level, dilation of bronchi resulting in increased and deep respiration, etc., are accelerated while other activities like digestion, micturition, etc., are temporarily held in abeyance. Adaptation to these stress conditions over long periods produces an adaptation syndrome such as non-specific stress syndrome, experienced by many a man at present. States of anxiety over long periods is believed to produce gastric ulcers, increased blood pressure, diabetes, eczema, etc.

ECOLOGICAL CRISIS

The history of Ecology is as old as the history of the human race itself. The subject matter of this branch of scientific knowledge has been called differently as Ethology, Bionomics, Relations Physiology, etc., by different people at different times. It was Ernest Haeckel who coined the term Ecology (Oikos meaning home) and in short, it can be defined as Biological Science of Inter-relations. It is a science of interactions between the organism and its non-living environment on the one hand, and the inter-relations of the individuals, populations, and communities on the other. Though this definition seems very simple the implications of its extension into the fields of human welfare, Anthropology and Sociology, to mention only a few, are far more complex and least understood.

Though Ecology is one of the oldest fields of human knowledge it has come to the forefront only in the recent years from its obscurity of the earlier times, thanks to the laborious efforts of a multitude of generations of scientists. This sudden upsurge, at national and international levels had

a tremendous impact on the fields of importance to human survival such as agriculture, veterinary medicine, public health, education, engineering, business, politics, law and etc. Ecology draws its information from various and diversified branches of scientific disciplines, social sciences and humanities. All the pieces of the puzzle are put together, so to speak in an orderly manner, while different disciplines are joined into one. Ecology has its own and distinct way of dealing and interpreting the data obtained from different sources and the final message is one of synthesis and balance. The crux of ecological thinking at the present juncture is essentially Holocoenotic. In the recent years the ecological approach to the studies of human society has given rise to a distinct and major field of Human Ecology in which sociologists, anthropologists, geographers as well as ecologists have found a meeting ground.

Man's influence on his environment is so enormous that Vernadsky (1945) has suggested the term NOOSPHERE (from Greek Noos meaning mind), for the world dominated by the human mind as gradually replacing the Biosphere, the naturally evolving living world that is in existence since Time immemorial. Whether we accept the implications of the Noosphere concept' or not we have to acknowledge that in these days of technological and atomic triumphs, man's role is quite a dominant one, establishing supremacy over the naturally dominant species of all biological communities. This has led certain top rank ecologists of the world to view the future of mankind with pessimism and pronounce the Gloom-and-Doom theory.

A time has come when we have to take stock of the situation dispassionately. That "Nature is red in tooth and claw" is more illustrative in the natural cataclysms like the upheaval and subsidence of land masses, earth-quakes, cyclones, tornadoes, tidal waves, avalanches, floods, droughts, dust bowls, etc., over which man's triumph and supremacy has no control. Leaving these aside and considering only the anthropomorphic, sociological, economic and political aspects of human race which purely and completely are endogenous in origin, we have the more, important problem of what we do to ourselves and to our environment. The tragedies of war and violence, the struggle for dominance and superiority between races, castes, creeds, societies, and finally different cultures on one hand and the unprecedented increase of

present population of the world with attendant and the universal threat of a multitude of problems, chief among which is the pollution of the environment on the other hand needs to be mentioned among many other equally, if not more, important problems.

The facts of history vis-a-vis the plight of mankind today are sufficient evidence that the problems of man and his environment are not problems of the men of individual countries. They are problems of the entire human race and the whole world. Our attempts at 'Mastery of the Environment' have been miserable failures, bringing in its wake unwarranted, unforeseen and poorly understood side-effects like contaminating practically all the environments, be it the ocean, the atmosphere, or even the remotest ice caps of Antarctica and Greenland, not to speak anything about the litter of wastes of space exploration that is gyrating around Mother Earth. Not a river, not an ocean bed, not a desolate mountain remains in its pristine glory to deserve the description of being natural. They all remain polluted to a greater lesser degree.

A greater and more immediate danger to our species is the very lack of scientific knowledge about environment or the ignorance of masses at large. Yet we try to formulate policies of far-reaching consequence in the matter of environmental management. The problem is whether we can retain a part of original Nature in some semblance of, though not in, its pristine glory or civilization can survive its own impact on Nature.

Much has been said and written about the population explosion and the prospective severity of multitudes of future problems. The outlook itself is indeed dismaying. At any rate if we have to continue in existence, the problems of under crowding and/or over-crowding have to be immediately brought under control, for which many a government, has launched an extensive programme of population control by way of family planning. Human population has undergone a number of growth phases during its evolution through Nomadic, Pastoral, Agricultural, Industrial, Technological and finally the present Atomic stages. These are responsible in a way to bring about coincident changes in the 'carrying capacity of the environment or the maximum (or 'K' value of the population student) value of species population resulting from the opening up of new

territories or the development of efficient techniques of exploitation of the environment. We cannot predict the impact of future population size of the world in the absence of data regarding the carrying capacity and the maximum asymptote value for the human population. Similarly we are not yet certain whether the Density-Dependent factors tend to level off the growth by exerting a strong control. Although it may be a devastating blow to our ego as men, we have to accept in all humility, that we know far less about our own species population than know about that of some other organism which perhaps is very meagre. Evidence is accumulating that animals tend to become more aggressive with increase in the density of population. Because of the propensity to kill and his aggressiveness, man also is included with the rest of animal species.

Koestler (1967) maintained that the “Paranoid Streak (Paranoia meaning disordered mind) is inherent in man’s nature owing to the basic split between his reason and belief or due to the inadequacy of the coordination between the emotive and discriminative faculties of the mind. “Paranoid Streak” refers to “a mental condition characterised by false beliefs which predispose to delusions of persecution or grandeur” (MacLean,1969) which may lead to catastrophic damages like the ill-advised usage of Thermonuclear Bombs which is sufficient enough to erase out most of the human population, if not the whole, as a species rather than killing people individually. Thus, we have advanced from the concept of individual death to death as a species.

The universally proclaimed democratic principle that ‘ All men are born free and equal both in dignity and in rights’ stands in jeopardy due to political, economic, social, and cultural inequalities affecting human group relations. Particularly striking obstacles to the equal dignity for all and which continue to haunt the world at large and certain cultures especially are the racial and sectarian prejudices. As a major social phenomenon this needs the attention of all students of human science.

The biological characteristics of universal value or the survival of species in any natural and cultural environment are based upon genetic capacity of the individual or a race for intellectual development. The evidence points out that no genetic advancement has been made by one

race over the other. But the progress made by man in every respect during the past millennia seems to be mainly on the level of cultural acquisitions and not on that of genetic endowment.

On the cultural level the human race can in general be described as having either a folk-culture which is basic and conservative and very slow in changing or an urban technological culture which is highly complex, radical in nature and prone to change rapidly in a relatively short time. This cultural aspect along with the public health and welfare and education, etc., makes the man an advanced and dominant member in his environment giving him the right for being a “Societal organism” in principle though not completely in practice.

The history of the success and fall of the human civilizations be it one of the very remote age or of the medieval times or of the immediate past would reveal the role of human mind in shaping the destiny of Homo sapiens. The Maya, the Inca, the Red Indian, the Indus Valley, the Mohenjodaro and Harappa, the Egyptian, the Aztec, the Roman, the Greek these and many more civilizations have come into being only to be erased out of existence sooner or later. They have had, in their own turn, a sense of wellbeing or euphoria, a sense of conquest and of equilibrium with the world and environment at large, a mass psychosis of war and violence and finally the death pangs of a disappearing civilization. Can we not channelise the human mind and thought in a more creative and meaningful direction? This takes one to the philosophical and metaphysical aspect of the purpose and meaning of life itself which of course is an entirely different and an alien field of enquiry. So, we have to be contented in asking ourselves what is our atomic civilization upto? or a Big Multi Trillion-dollar question Quo Vadis?’ (whither goest thou?).

ENVIRONMENT & SENSE ORGANS

The space outside of us abounds with unlimited quantities of ambient energy and there are many and diversified types of information available in the environment. The more one can gather of this information from the environment and act effectively, the greater are the chances for the survival in the struggle for existence. The tactile information enabling one to know the shape and texture of objects; the olfactory and gustatory clues giving us views about foods and neighbourhood; the auditory information concerning communication and the detection of sounds sometimes of survival value, the visual information giving us clues about the nature of the objects and their movements, food, shelter and enemies, determining our emotions are but only a few examples. These qualities of the external environment have to be obtained, coordinated and evaluated simultaneously for their intrinsic value at the conscious level.

More vital is the information obtained from internal environment or that of the body and its interior which is gathered and used continuously as in the case of postural mechanisms involving the position, rate and direction of movement, the equilibrium of the body; the tone of the muscles: the thermoregulation, the regulation of the levels of saturation of oxygen and carbon dioxide in blood; the rate of pumping of blood, the rate of heart beat, etc., etc. During the course of evolution several sense organs of varied structure have been developed for collecting diversified information from the environment. A sort of analysis of the environment is carried out by these specialised and sophisticated sense organs which are thus regarded as the most efficient analysers. Simultaneously neural processes for the conduction of the coded information and integration of the information in the analysis centres of brain or elsewhere in the central nervous system have been attained and these spread commands to muscles for work, glands for secretion and to the other effector systems for the execution of work.

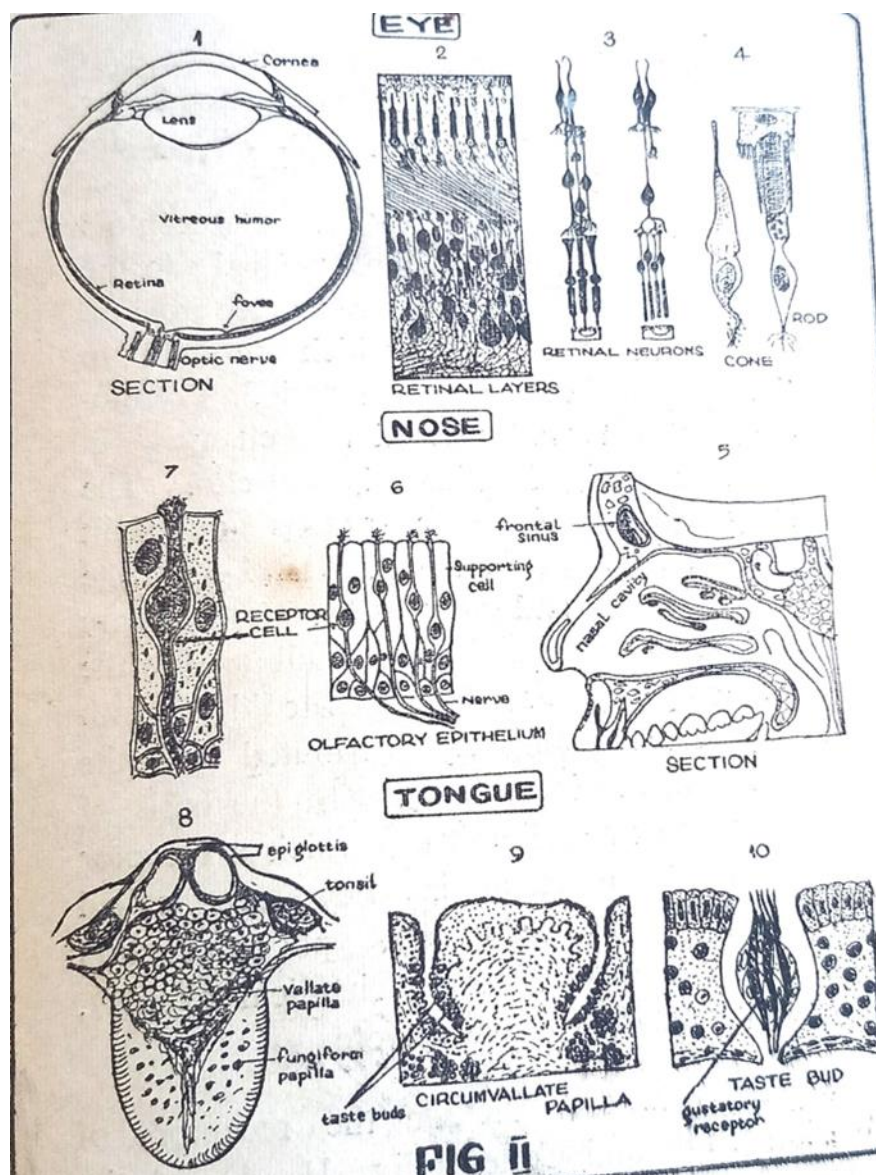
The more the variety and variations in the environment the more varied and complex are the sensory structures that deal not only with the

presence or absence of certain stimuli but also with the small changes in the magnitude of these stimuli. They also concern with the amplitude and its changes, duration, the rate of onset and decay, the timing with reference to earlier ones, and even the more complex parameters like colour, density, wavelength, frequencies, concurrent sounds and odours, etc.

The qualities of our environment are highly varied and they impinge and act on us. We react to these stimulations through our sense organs or receptors. The specialized structures designated to set up nerve impulses in response to changes in the environment constitute the receptors and these are designed to receive particular qualities of stimulus and respond to specific environmental changes. Some may be readily affected by the radiant energy like heat or cold (thermal) or light (photic) or chemical energy as in olfactory or gustatory or mechanical energy as in hearing or postural reflexes, etc. Thus, the modalities of stimulations are highly varied. The stimulus may be defined as any change in the external set up or the environment of the excitable tissue which if sufficiently intense will excite the tissue and cause it to display its characteristic activity.

Stimulation of a given sense organ results in its own peculiar sensation. The more is the energy impinging on the sense organ the greater the consequent sensation that is experienced. Weber-Fechner law explains the relation between the intensity of the stimulus (quantitative) and the intensity of the resulting sensation. It says that the intensity of sensation is proportional to the logarithm of the number representing the comparative strength of the stimulus. The specificity of the effects of the excitation of any sense organ or nerve is determined by the place or mode of ending of the nerve. Thus, the sensations of seeing, hearing, smelling, tasting, etc., are the vital phenomena experienced in the corresponding centres of the brain. (Fig. IV. 14)

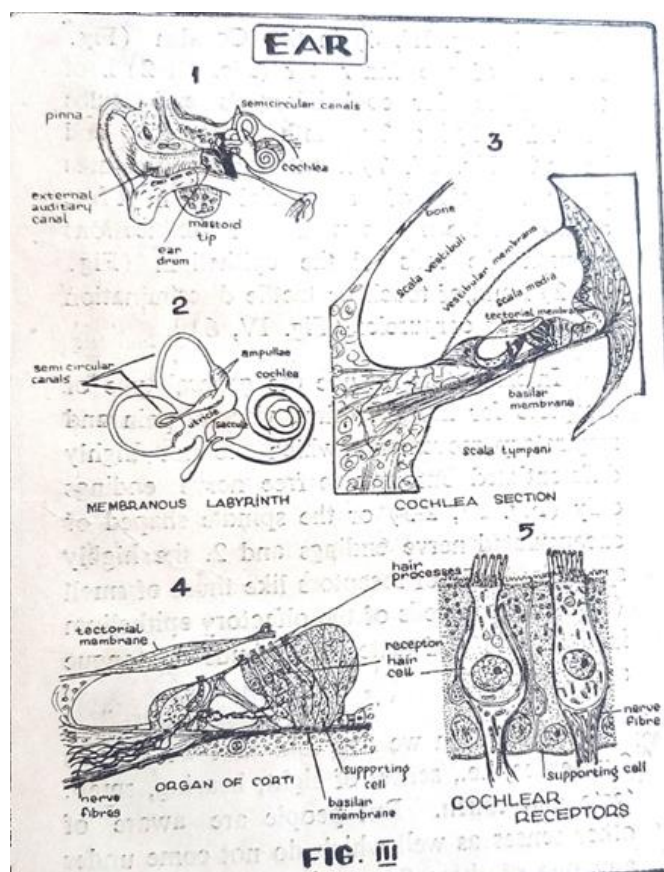
Receptors have been classified differently. They may be subdivided into two major groups. 1. Somatic including the receptors of the skin and those of the skeletal muscles and



2. Visceral including the receptors located in the organs innervated by the autonomic or visceral efferent nervous system. They are also classified on the basis of the point of origin of the stimulus into 1. Exteroceptors which respond to the stimuli applied to the surface of the body or which come from a distance, 2. Interoceptors which respond to stimulations from the viscera and 3. Proprioceptors which are activated by changes in length or tension in skeletal muscles. The highly specialised sense organs of sight (Fig. II, 1-4), hearing (Fig. II, 1-5), taste (Fig. II, 8-10) and smell (Fig. II, 5-7), are localised and confined to a small area while the sensory structures for touch, cold, warmth and pain are extensively distributed over the entire surface of the body. On the basis of the nature of the

stimulus to which a receptor is designed to respond, they are called photoreceptors (light); phonoreceptors (sound), chemoreceptors (chemical agents), pressoreceptors (pressure), etc.

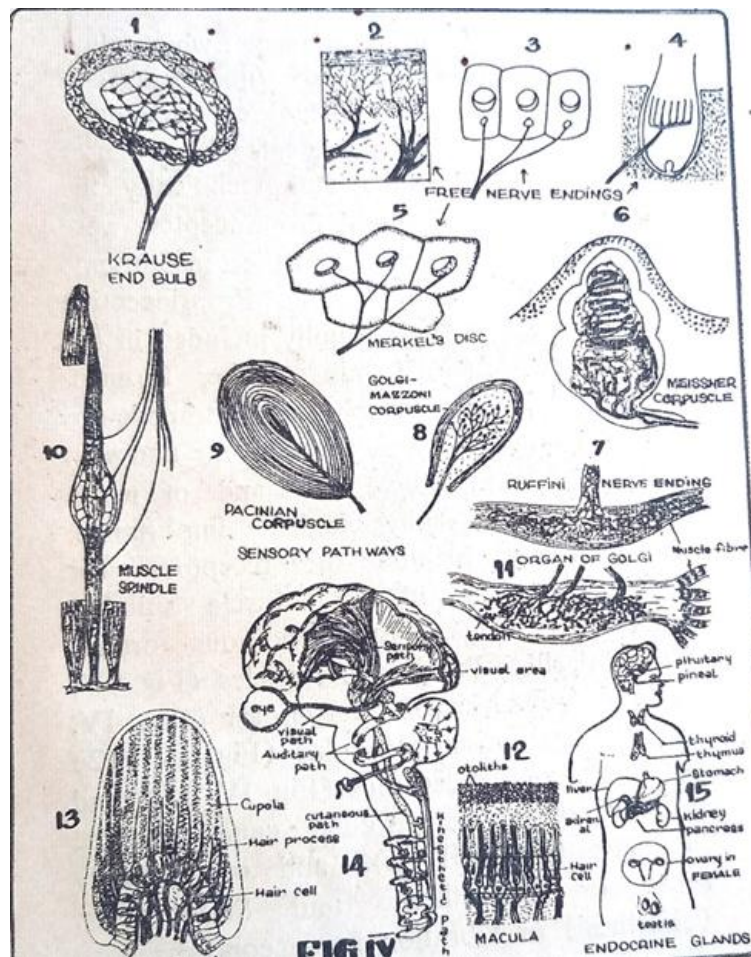
Exteroceptors include the receptors of vision [Rods and Cones (Fig. II, 4) of the Retina (Fig. II, 2) in eyes] of hearing [organ of



Corti (Fig. III, 4) in the Cochlea (Fig III, 1) of the inner ear (Fig. III 2)], of temperature, for cold [Krause's end Bulbs (Fig. IV, 1)] and warmth [(Ruffinis end Bulbs ? (Fig. IV, 7) , extreme temperatures producing pain, of superficial pain [free endings of the nerves with their ramifications between the cells of the epithelium (Fig. IV, 2)] and of touch or tactile discrimination [Meissner's corpuscles (Fig. IV, 6)].

Interoceptors include the general type of receptors for hunger, thirst, visceral pain and respiratory movements which are not highly differentiated but involve free nerve endings only (Fig. IV, 2-5) or the spindle shaped or encapsulated nerve endings and 2. The highly specialised type of receptors like those of smell (bipolar nerve cells of the olfactory epithelium in the nose) and taste (taste buds on tongue and epiglottis).

As children we are told that we possess five senses, i.e., senses of sight, hearing, smell, taste and touch. But people are aware of other senses as well which do not come under any one of these five major categories. The



muscle sense or kinaesthetic sense which plays no less important role in the functioning and survival of man has been experimentally shown to be another major category of senses (Sherrington; Lissman) and technically the terms Proprioception and Proprioceptors were coined for the sensations and the sense organs respectively. Although the Proprioceptive system of receptors is usually included in the minor sense organs certain of the Proprioceptors like the muscle spindle of tetrapod's are second in complexity only to the ear and eye, in the richness of nerve fibres and of nerve endings and in physiological importance. Proprioceptors include the receptors for position and movements [Muscle spindles (Fig. IV, 10), Musculotendinous organs (Fig. IV, 11), Pacinian corpuscles (Fig. IV, 9) and Golgi-Mazzoni corpuscles (Fig. IV, 8) 1, of equilibrium (Maculae (Fig. IV, 12) and cristae of the sacculus (Fig. IV, 13), and utriculus of the semi-circular canals of the inner-ear (Fig. III 2)] and of vibratory sense or Pallasthesia and Stereognosis. Pallasthesia or vibration sense concerns with the perception of the stimuli of vibratory nature impinging on the body surface. Experiments with vibrations from low pitched tuning forks applied to bone tendon and muscle or even the soft tissues indicate that the proprioceptors situated deep in the muscle and tendon or even those receptors in the skin and subcutaneous layers are stimulated by mechanical changes in pressure causing the receptors to send impulses synchronizing with the tuning fork. It plays an important role in the diagnosis of neurological disorders.

Since the earliest times, vertebrates including man are known to possess highly organized and often quite complex end organs which are responsible, in their entirety, for the sensation of position and movement owing to their usual association with the muscles. These receptors are generally referred to as muscle receptors and comprise the Neuromuscular spindle or muscle spindle or Stretch Afferent, the Golgi tendon organ or the Golgi tendon spindle or tension recorders and the encapsulated bodies such as the Pacinian corpuscles. We owe much to the extensive pioneering experimentation of Sherrington and to the most outstanding contribution of a host of eminent men, and this is mainly responsible for our present knowledge of the anatomy and physiology of the muscle receptors and their functional significance in the behaviour of the organism.

According to Sherrington (1906) proprioceptors are somatic sensory endings which are stimulated by the actions of the body itself in a much greater measure than the sense organs of the surface field of the organism. Giving a wider application for the definition to include certain other types of sense organs which cannot be stimulated by the actions of the body itself, Lissman (1950) redefined them, while reviewing the range and capabilities of Proprioceptors, as 'sense organs capable of registering continuously deformations (changes in length) and stresses (tensions, compressions) in the body which can arise from the animal's own movements or may be due to its weight or to other external mechanical forces".

It is the consensus of opinion that the Proprioceptors help to integrate the innumerable parts of the body with reference to each other and the animal as a whole to its immediate surroundings. Besides, Some or all of the Proprioceptors are also known to be responsible for (i) making the animal, as in the higher forms, aware of its bodily existence, (ii) participating in the conscious proprioception by signalling changes in the tension and length of the muscle along the classical proprioceptive path the integrity of which has been found to be essential for the normal sense of position and of movement (however, it is believed that the receptors of the muscles play part in the mechanism underlying the awareness of movement and position, but instead seem to be concerned entirely with the unconscious adjustments mediated by spinal and cerebellar reflex arcs), (iii) acting as very good general indicators of the animal's tone due to their integration with the general behaviour of the organism, going to sleep with the animal and resuming activity when it wakes up by virtue of their participation in the tonic reflexes owing to their powerful connecting lines with the motor centres especially the Cerebellum which is held to be the governor of the animal's tone, (iv) the regulation but not initiation of movement providing an accurate control of timing for the locomotory rhythm and (v) maintaining the balance of the organism both during static and dynamic phases of locomotion. Thus, many complex instinctive acts that are normally executed by the organism in its natural medium, as a response towards the conditions imposed by the latter on the former, contain elements of chain reflexes in which the proprioceptive mechanisms are believed to play an important role.

Highly complex receptors like the eye and ear, etc., consist of 1. Non-sensory and accessory structures of diverse nature and varied origin which subserve the function of aiding or promoting the process of information collection by 2. Sensory or receptor or transducer elements (Fig. II, 4 and III, 5) which are principally and solely effected by the impinging stimuli so as to result in the generation of an impulse that is conducted away by 3. Afferent nerve fibre in the form of coded signal to the integrating centre in the nervous system. The large number of accessory structures share the common property of promoting the receptive process by way of facilitating the responsiveness of the receptor to the specific type of stimulus. For example, the cornea and the lens of the eye (Fig. II, 1) help to focus the light on to the rods and cones (Fig. II, 4) of the retina, i.e., the transduction elements (Fig. II, 2 and 4) of the eye for the formation of a good optic image while several of the muscles help in scanning the field of vision by rolling the eye as due to the oculomotor or in adjusting the curvature of the lens as due to the ciliary or in allowing the right quantum of light as due to the sphincter muscle of iris. Transducer elements are in general derived from the dendrites of the nerve cell or they may even be formed by non-nervous structures like rods and cones of the eye. These elements of each of the receptor are sensitive not only to a single variety of stimulus- either photic, mechanical, chemical or thermal but some of them also have specific sensitivity within a very narrow range of any given modality of stimulus. The externally impinging stimulus, may it be in the form of mechanical, chemical, thermal energy, etc., is translated by these organic and biological transducers into an infinitesimally small bioelectric current called the Generator or Receptor potential which is graded and whose amplitude is a function of the strength of the stimulus. When this Generator potential, which can summate, reaches a specific level of strength the nerve cell experiences a depolarization resulting in the generation, automatically, of an All-or-None electrical potential or an impulse that is conducted away all along the course of the nervous pathway to the CNS without any change in its amplitude or velocity. Thus, the receptors act as Analog coding mechanisms wherein the intensity of the stimulus is analogously coded into a potential amplitude which in its turn produces signals or impulses digitally giving rise to another process of frequency coding. These are the analysis programmes carried out at the periphery of the organisms and conveyed to the computing and integrating centres of CNS.

The natural processes of analysis, perception and integration of the sensory information leading to the conscious or unconscious evaluation of the biological relevance of the physiological stimulus in most cases defeat the human understanding and intellect. Our environment is defined, Delimited and understood partly by what we possess as our sense organs. Thus the behaviour is made incalculably complicated by the interaction of several incoming modalities of senses of highly complex nature and the ever present subtle stimuli to which we react at the conscious unconscious levels. Highly evolved as the human senses are, yet they have their own limitations. It would be highly interesting and curious to know and experience what the world would seem to be if only we could extend the range of our sense organs in a natural way instead of relying on the instruments like the microscope, electron-microscope, telescope, radio, radar, telephone, X-ray, infrared ray, etc.,

HOMEOSTASIS & INTEGRATION

The most striking and unique feature of the organism is its ability of self-regulation which has been termed the principle of Homeostasis (Cannon, 1932). Ideal state of conditions of living are approximated by the homeostatic mechanisms. Claude Bernard, a French physiologist, has formulated, as early as 1850, his theory of milieu-de-interior which states that higher animals possess an innate ability to maintain a more or less constant internal environment enabling them to be somewhat free from the environmental fluctuations and vicissitudes. This is not to be seen in the lower animals. These homeostatic mechanisms can be considered as physiological, psychological, ecological, genetical, etc. The metabolic activity supported by the ingress of food, its digestion, assimilation and circulation through the entire body so as to reach every cell of the body, the oxidative, nutritive and feeding mechanisms ; the hunting, or food procuring adaptations ; the interruption of the active wakeful state by the passive sleep state allowing for the physiological recuperation which involves the play of a fundamental circadian rhythm; regulation of blood flow, body heat, body water ; maintenance of salt balance; protection of home and territory and a host of other related behaviouristic patterns are but only a few examples of the homeostatic drives of the organism. Almost

all the behaviouristic patterns have been included. A blood vascular system aids man to maintain this near constant or balanced state of the internal environment to which the organs of the body are exposed without being influenced by the varying external environment. The fluids and chemical substances inside and outside the cells in the body are regulated within the very narrow limits required for the metabolic processes.

Division of labour, i.e., relegation of different functions to different organs and organ systems has led to extreme specialization of cells, tissues, organs and organ systems and this has resulted in the concomitant development of Integrating and Coordinating mechanisms. The organism living in a diversified and everchanging environment, constituted by a multitude of cells, tissues, organs and organ systems continues to exist and behave as a single unit because of the development of the ability to adjust to the varying environmental conditions on one hand and of complex processes of integration, communication and coordination on the other. As in other animals the overall integration is brought about in man by a more fundamental and archaic system, the vegetative mechanism of Humoral or Hormonal control and by a phylogenetically more recent system, the Nervous system or Neuronal control. Thus, the integration of the multifarious and complex patterns of activities are brought about either purely by way of the Humoral mechanisms or entirely through the Neural mechanisms or as in the case of certain important functions such as heart beat, both the mechanisms, i.e., Neurohumoral may be utilised.

A variety of chemicals of organic nature like steroids, amino acid derivatives and proteins of small molecular weights Come under the category of Hormones. These materials are secreted by various cells some being highly sophisticated glandular cells and liberated into the blood stream which circulates these hormones through the entire body. Most of the cells, if not all or specific organs in the body, or targets react to the presence of these hormones, experiencing either an increase or a decrease or cessation of their activity. Several of the secreting glands do not possess specific ducts for liberating the materials into the blood stream and hence they are called ductless or Endocrine glands. Of these the thyroid, adrenals and pituitary are the examples (Fig. IV, 15) Exocrine glands like pancreas, testes, ovaries and intestine secrete non- hormonal

products into the body cavities besides secreting and liberating hormones into the blood.

The quantity of the hormones liberated into the blood stream is extremely small and is effective only in extremely low concentrations. After their release sooner or later they are either inactivated or destroyed. The level of their concentration in the blood stream, or as in some cases the external stimuli, may also decide the rate of release of the hormones into the blood. These hormones may regulate the metabolic activities or control the reproductive process of the body or may even be concerned with bringing about harmony between the activities of various hormones may also negotiate between the nervous system and vegetative cells and tissues in order to bring about the unity and wholeness of the organism.

A poorly understood physiological mechanism known as Blood-Brain Barrier (B.B.B.) stringently restricts the transport of foreign materials into the central nervous system. As a result of this barrier the circulating humours have no influence on the central mechanism. This may, perhaps, be one of the ways by which the brain protects itself from physiological vicissitudes of the body and more so of the circulatory system, carrying in its wake both useful as well as waste products. Thus, to be active, the brain synthesizes from its substrate a small group of amines, usually known as biogenic amines, such as Serotonin, Histamine, Dopamine, Norepinephrine and γ -Butyric acid (GABA) which assume a large and highly specific role as the determinants of pre-disposition to behaviour. The biogenic amines are known to influence important phenomena like states of sleep, wakefulness and alertness and alter the physiological states and behaviour, In addition, neurosecretory activity is found in the core structures of the brain stem and these secrete a set of unidentified chemical substances known as releasers into the venous portal system bathing the brain's base at the junction of the pituitary gland. The core structures of the brain stem contain from front to back receptors sites which are also sensitive to a variety of physical and chemical agents like estrogenic steroids, blood glucose, amino acids, etc., osmotic equilibrium of electrolytes, androgenic and adrenal steroids. These neurosecretory and receptor mechanisms of the brain are integrated into the physiological mechanisms which determine the psychological predisposition and finally the specific mood and behaviour of a person. Neural function is based on

chemical principles as is the case with other activities of a living system. The energy needed for its maintenance is drawn from the chemical reactions of its metabolism. Synapses are put on and off by on and off by chemicals. That the programming of the neural events has a molecular-basis is confirmed by recent findings.

It is well known that communication between neurons in higher animals and man is through chemical agents or Neurotransmitters. These chemicals of infinitesimally small quantities or of quantal units are released from the terminal of a neuron and cross the synaptic space or intraneuronal space only to influence the excitability of the neuron next to it. It was found long ago that Acetylcholine in peripheral nervous system and Acetylcholine and Noradrenaline in Parasympathetic and Sympathetic parts of the autonomous nervous system discharge the function of Neurotransmitters. Similarly, Dopamine, Noradrenaline, Serotonin and Acetylcholine play their roles as Neurotransmitters in the visceral brain. These amines are confined exclusively to the subcortical areas of brain which are associated with mood, sex, appetite and primitive motor functions. In general, potentiation of amine action leads to enhancement of mood while depletion or blockage of amines results in tranquillisation.

Modern Neural homeostat is conceived as comprising (1) a sensitive receptor element, (2) a messenger feedback loop and (3) a governing bias. A negative feedback unit which is equipped with a device by which the bias can be set is an essential component of a homeostat. In the homeostatic mechanism the bias of the homeostat is all important and in human lives this bias is provided by motivation, learning, memory (short, long, genetic and eternal) and impressions in the form of past experience. It is against this bias that the working of the homeostat is compared during activity and any incongruities or errors are immediately fed back into the system by the feedback loop. Changes in bias and regulations for operation of the bias are governed by different sets of laws.

Organisms possess mechanisms for calibrating or indicating the appropriateness of the intensity of reaction. The ultramodern engineering device of a feedback or the return of a signal of error or an indication of state of reaction is a mechanism of antiquity in biological systems. The

role of a feed back in the integration of physiology of heart beat, blood pressure, Muscle contraction, etc., is unique and forms a part of the reflex mechanisms. Reflexes test the input energies (stimulations) against some criteria established already in the organism.

A modern computer when turned on sits warming up purring through its magnetic drums and scratching its multivibrators. Yet no semblance of the computing function is discharged, despite a large store of fascinating information stored in its drums as memory, until it is given the proper instructions for functioning in the form of a programme. Depending upon the type of instructions or programme that is given to it the computer starts acting like any one of the infinite variety of computers with specific information stored in its system as memory. Thus, nothing happens without a programme. A computer must necessarily have a programme in order to function. Often the human brain is compared to a computer. In truth it is more than a computer. There is a lot more in the human brain than there is in the computer. If the similarity were to be true the brain also must have, analogous to the computer, a programme or a plan of action. In other words, a man must have a plan or specific goal to be achieved either on a short term or on a long-term basis.

Neurophysiological and behavioural experiments of the recent decades on the frontal lobes of the brain have been responsible for the belief that the frontal lobes play a very crucial and important role not only in providing action programmes but also in participating in the mechanisms of matching these programmes with results of actions performed. Establishment and realization of plans of behaviour and the checking up of final results of activity against intention are the functions associated with this part of the brain. It plays a crucial role in the organization of the entire sphere of Man's activity. Action is carried out with initial intention or motive or concept. In the complex process of matching the motor analysis or the evaluation of success or failure or error, the frontal lobes play an important role. This provision for correction of action, in case of need, is sub-served by feedback signals forming a very important link in the mechanism. Frontal lobes provide a broad kind of coordination of sensory and motor elements and are essential for the utilization of the products of sensory areas for mental synthesis and form an Important part of the central apparatus forming the organ of abstract

thought. Evidence indicates that the Reticular formation of the brain regulates selection, activation and equilibration which are all important in the motivational or drive mechanisms of the organisms. These are intricately connected with homeostatic mechanisms of the organism. The Limbic system of the brain regulates the emotional disposition of the organism by the use of neural homeostats

A century of neurophysiological experimentation bears out the fact that a series of specialized centres exist in the central nervous system (C.N.S.) and that these control one or the other of the metabolic and endocrine activities of the organism. These centres are highly sensitive to one or the other specific physical or chemical agents in a similar manner to the receptors of peripheral nervous system. These receptor mechanisms are located around the mid line ventricles of the Brain stem and constitute centres for respiration, food intake etc., and function as a variety of sensitive elements which are selectively sensitive to different physical and chemical processes that are to be regulated. Thus, they act as a variety of Homeostats concerned with the appetitive-consummation process.

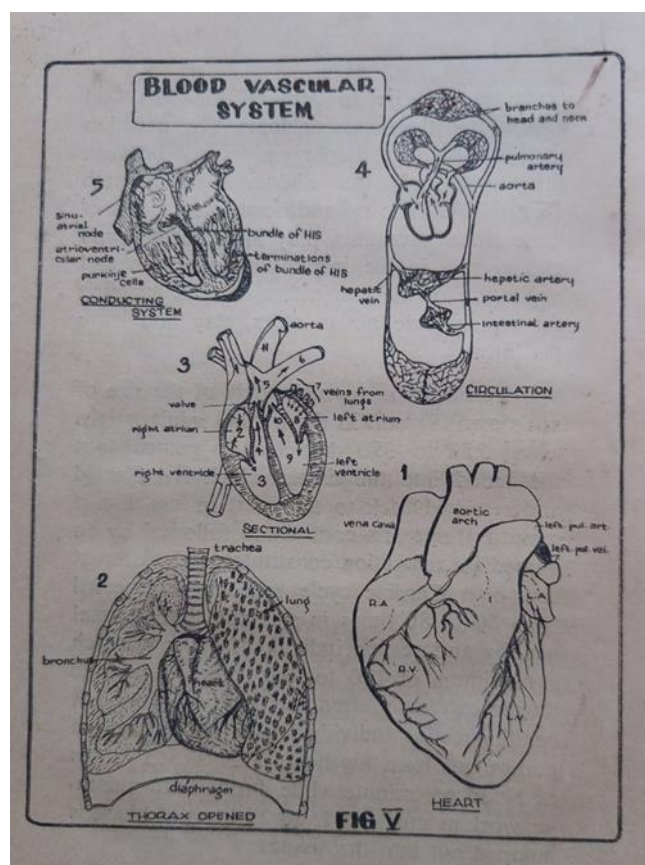
BLOOD VASCULAR SYSTEM

The Heart, a highly complex organ, forms the central pump house for the circulatory system. It exhibits the unique features of excitability, rhythmicity, conductivity, contractility and distensibility. The special cardiac muscles that make up the heart display the capacity for unceasing contractions and relaxations alternately during the entire life span of an individual. The uniqueness of the heart lies in the fact that it is much older than the individual it serves since it comes into distinct anatomical and functional existence even at the earliest foetal stage of the developing individual and that too much in advance of the formation of any nervous tissue.

The heart, a highly muscular organ (Fig. V-I), is enclosed in a fluid-filled membranous sac called Pericardium for prevention of mechanical

injuries during its contractions. It is located frontally and in between the lungs in the cage of the thorax formed by the ribs and intercostal muscles (muscles that lie in between the ribs) all around and the muscular dome like partition that is called the diaphragm located between the thorax and the abdomen underneath (Fig. V-2). The up and down movements of these three structures play an important and crucial role in the inspiration, retention and expiration of the respiration of man enabling the atmospheric air to enter, stay and leave the lungs.

The heart is approximately of the size of one's own fist and in the normal adult weighs about 250 to 350 grams and pumps out the blood into the tissues which is collected and returned back to the heart in less than a minute's time. Its contraction followed by an immediate relaxation constitutes a single heart beat or a Cardiac cycle and this is repeated from 60 to 80 times in a minute in a normal healthy and resting individual. It may reach a maximum of 180 to 260 times a minute during extremely strenuous physical work. A healthy resting individual with empty stomach pumps out from his heart 3.5 to 5.5 litres of blood per minute while during hard muscular work as much as 15 to 25 litres of blood is pumped out into the tissues.



The heart is a hollow muscular organ divided internally into right and left halves by a longitudinal septum extending between the base of the heart and its apex (Fig. V-3). A transverse groove i.e., the Atrioventricular groove divides each half into Atria and Ventricles on each side thus forming four chambers. The upper two are called the left and right Auricles or Atria while the lower ones are called the left and right ventricles. A partition or a septum separates the right and left halves of the heart. The right half contains the 'Blue' or 'impure' or the deoxygenated blood while the left half contains the Red' or pure or oxygenated blood. These two types of blood are effectively separated from each other. Located in the aperture between the Atrium and the Ventricle on the left side is the Bicuspid or the Mitral valve while the aperture on the right side contains the Tricuspid valve. Similarly, there are two semilunar valves located one each at the base of the Pulmonary Artery and the Aorta. These valves play a very crucial role in directing the entry and flow of the blood in one direction (From atria – ventricles - arteries) without any mixing up of the oxygenated and deoxygenated portions of the blood. Defective valves lead to pathological conditions which may even be so serious as to cause the death of the individual. Similarly blocking or cessation of blood supply to any organ or tissue results in grave conditions and not infrequently a man succumbs.

Thanks to the pioneering work of William Harvey (1578-1657) and the contributions of many researchers in Medicine during the later periods, we have at present a precise picture of the blood circulation in the human body. The blood is circulated to all the organs and tissues of the entire body by the arteries and their branches and a multitude of capillaries. From here it is collected by an ascending series of venules and veins which return the blood back to the heart, the pumping station for recirculation. All through its course the blood is contained in tubes of different dimensions which form along with the connected heart a single system i.e., the circulatory system, which thus constitutes a closed system. The excess of blood that is needed during emergencies is not circulated always. On the other hand, the body contains certain store houses- or blood depots like spleen, liver, lungs and skin where extra

blood is stored temporarily and is brought into circulation depending on the exigencies of the situation.

The continuous flow of blood along the vessel is due to the unceasing and tireless activity of the heart. Whenever the heart contracts the blood is driven from the left ventricle into the Aorta and from the right ventricle into the Pulmonary Artery (Fig. V-3). When the ventricles relax the left ventricle is filled in by the blood which enters the left Atrium from four Pulmonary Veins and the right ventricle is filled by the blood from the right, Atrium which collects the blood from the two Venae Cavae. This period of contraction followed by the relaxation is called a cardiac cycle. The contraction of the cardiac muscles is known as the Systole while its relaxation is referred to as Diastole. A cardiac cycle starts with a systole of the Atria followed by their diastole. Then follows the systole of Ventricles and their subsequent diastole, during which both the Atria "and the Ventricles i.e., the entire heart is relaxed. This is the pause of the heart. Cardiogram is the record of heart beat. During the activity of the heart tiny electric potentials arise and the instruments specially designed for recording these minute bio-currents of the heart are called Electrocardiogram which are of extreme use in the diagnosis of any pathological condition of the heart.

The blood is pumped by the heart to the organs in the body along two routes (Fig. V-4). In the Systemic (or greater) circuit the pure blood is pumped by the left Ventricle into the Aorta, the numerous branches and their ramifications of which take the blood to the capillaries of all the organs and tissues i.e., virtually to every nook and corner of the body. The impure blood is collected from the capillaries by the ramifications and the branches of the veins and ultimately brought back and poured into the right Atrium by way of the veins (Superior and Inferior Venae Cavae). From here the blood flows through the Tricuspid valve into the right Ventricle. By the contractions of the Ventricles this impure blood is driven along the Pulmonary or the lesser circuit. The impure blood leaving the right Ventricle enters the Pulmonary Artery and its branches deliver this blood to the pulmonary capillaries of both the lungs. After the exchange of gases in the capillary network of the alveolar chambers of the lungs the pure blood is collected by the ramifications that finally unite to form four Pulmonary Veins which return the pure blood to the left Atrium. This pure

blood then enters the left ventricle only to be driven along the systemic circuit once again.

Endothelium and layers of musculature and connective tissue form the walls of the arteries and their branches and hence the substances dissolved in the blood cannot leak through the walls into the interstitial spaces. The minutest and extremely fine vessels connecting up the arteries and veins are called the capillaries which form a network which is extensively developed in the organs and tissues. The ultimate transfer of materials between the blood and the cells of the body takes place across the wall of the capillaries. The walls of the capillaries have only a single layer of endothelial cells whose thickness is not more than .005 millimetres. So, the penetration of various substances across this wall is very easy.

The muscles of the heart are of two different types. The entire mass of the heart is made up of the elements of the muscular syncytium or the contractile myocardium. Muscle fibres of another variety with less striations, finer myofibrils, greater sarcoplasm and containing less glycogen are also present and this second variety of muscles constitutes the conducting system of the heart. This differs from the rest of the cardiac musculature in its greater excitability and higher conductivity. At several points in the heart accumulations of muscle fibres of the conducting system are seen. Insufficiently differentiated muscle fibres abounding in sarcoplasm are found beneath the upper layer (epicardium) of the wall of the right Atrium of the heart and where the superior venae Cavae enters the atrium. This accumulation is known as Sino-Atrial Node. Another accumulation is found in the lower part of the Atrial septum extending partly through the Ventricular septum into the Ventricles (Fig.V-5). This is called the Atrio-ventricular Node and gives off a long and narrow muscle bundle called the Bundle of His which runs down the Ventricular septum and forms a link between the Atria and the Ventricles. This bundle of His breaks up into two branches each of which runs down along the internal surface of the right and left Ventricles. These branches break up and establish contact with the Purkinjie nerve fibres located under the internal layer (endocardium) of the Ventricles. All these structures contain the muscle fibres of the conducting system. The Sino-Atrial and Atrio-ventricular Nodes possess a large number of nerve cells which give off

Axons into the muscles and hence form the Neuromuscular structures. These nerve cells receive fibres from the Vagus nerve.

Since the excitation responsible for the contraction of the heart normally always begins in the Sino-Atrial Node, this node is called the 'Pace Maker' of the heart. From the pacemaker the excitation is propagated to the Atrial muscles spreading at the rate of one meter per second and reaches the specific musculature of the Atrioventricular node. This excitation and conduction speed becomes reduced and is slowly transmitted to the Bundle of His. This delay in conduction brings about the ventricular systole after the end of the Atrial systole.

The watery substance in the blood, called Plasma, is composed principally of water, containing a large number of dissolved organic and inorganic materials. The plasma contains blood proteins which help in the clotting of blood, and antibodies which fight the disease producing organisms, amino acids, sugars, fats and other substances needed for cell metabolism in addition to the gases like oxygen and carbon dioxide and the waste materials produced during metabolism.

Red blood cells or corpuscles are by far the most numerous cells and number about 5 million per each cubic millimeter of blood. These are produced in the central core of the bones or bone marrow. They do not possess any nuclei but contain large quantities of Haemoglobin which can absorb oxygen in great quantities. White blood cells are of different kinds and are produced in the bone marrow, lymph nodes and spleen. About 8-10 thousand cells are present in a cubic millimeter of blood. These are nucleated and some have more than one nucleus. The white blood corpuscles engulf any foreign body that enters the blood, such as disease producing organisms, and protect the body. The white blood cells that die during the process accumulate and form the pus in the infected wound. Platelets which are much smaller in size play a very important role in the clotting of the blood at the site of injury owing to the enzyme present in the platelets.

The circulatory system subserves several important functions such as (1) the supply of materials of different nature needed by the cells, chief among which are the nutritive materials that form the very basis for the release of energy and the Hormones, Enzymes etc., needed for the growth, well-being and the very survival of the organism, (2) distribution of oxygen to all the cells for their respiration, (3) removal of metabolic wastes like carbon dioxide, urea, lactic acid, water, etc., and (4) the discharge of the duties concerning the offence and defence of the organism.

NERVOUS SYSTEM

The generalizations that explain the overall picture of the structure and functions of the nervous tissue are that it is a specialist and it exhibits the greatest sensitivity or irritability enabling it to react to varied kinds of stimuli, and the effects of the stimulations can be conducted or transmitted to distant parts of the body.

The cardinal features of the functions of the nervous system can be described as (1) it is most widely distributed in the body, like the blood-vascular system, extending over to all the nooks and corners of the organs of the body and it is more extensively distributed over the exposed surfaces of the body, (2) its continuity and oneness without any discontinuity in the innumerable ramifications which enable the system to act as a single and whole unit and, (3) its role in relating one part of the body with another. These features allow the nervous system to be in touch with the events in both the internal and external environments of the body always and allow it to influence, to a great extent, the different parts of the body. Neuronal mechanisms interrelate the functions of all parts of the body with one another. Any activity of the nervous system must be considered against the background of all its parts since activity in one-part influences or is influenced by the activity in another part. It subserves the whole body but not any individual part of the body and as a result individual acts or attributes emerge out from its widespread activity.

Stimuli from the environments, both external and internal, are received and related messages are propagated along the nervous pathways into the Central Nervous System (C.N.S.) where the information is sorted out and interrelated. On the basis of integration of this sensory data messages are poured out through motor parts of the nervous system to the muscles causing movements or the glands causing them to secrete their juices. Thus, in short, mechanism of all the sensations and responses to sensations lies in the nervous system. The qualities of the environment and the body itself are impressed on the C.N.S. by the sensory functions while the means of expression of the events occurring within the constitute C.N.S. resulting from sensation the motor functions. These two i.e., sensory and motor aspects are negotiated by the large mass of the C.N.S. including Brain Spinal cord and their multitudinal divisions and branches.

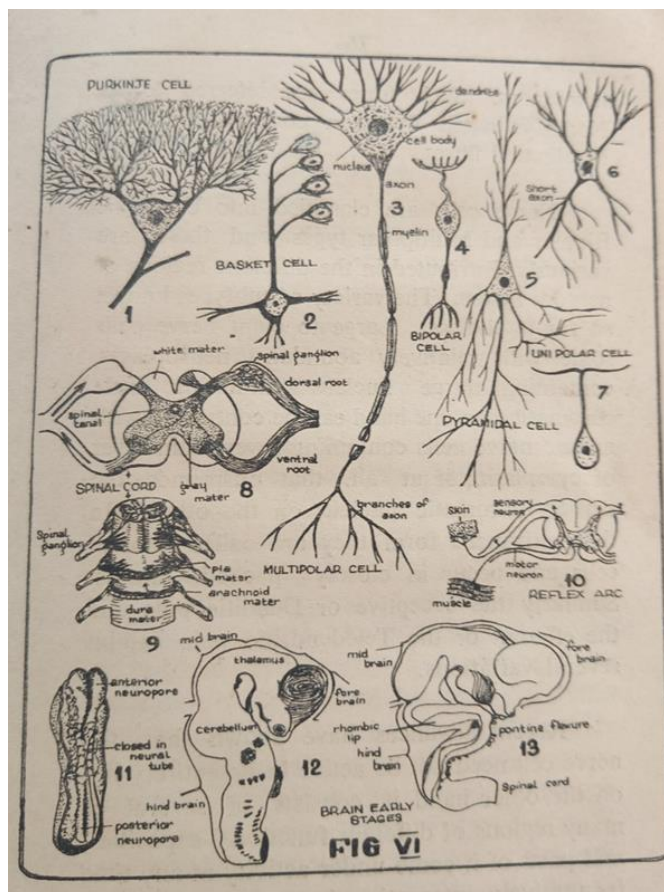
The C.N.S. which is responsible for the interpretation and elaboration of the sensory stimuli and the selection of appropriate motor expressions exhibits various levels of integration and utilization of the sensory impulses and this has reached the zenith of evolution in the human brain which is characterized by consciousness, memory, thought, speech and language functions which are little understood even at this juncture of our technological triumph. Any consideration of neurophysiology (the function of the nervous system) must be started obviously with the consideration not only of the functions of the fundamental units or basic components that constitute the nervous system but also of the very gross structural details of these parts in addition to the consideration of the mechanisms of the intercommunication of these units and the ultimate results that accrue out of these intercommunications.

Nerve Cell:

The 'Neurone Doctrine' states that all nervous systems consist, mainly, of myriads of distinct cells called Neurones that specialise for excitation and conduction. The nerve cells or Neurones are of different sizes and shapes (Fig. VI, 1-7). They may vary in size from a few microns (1P 1/1000 of a millimeter) to 100 microns in diameter. Each nerve cell is an individual and separate entity which is anatomically distinct from all other Neurones and from the neighbouring supporting cells of the cellular

matrix in which they are embedded. Each cell is bathed by the blood plasma and is covered over by a surface membrane consisting of specially oriented complex of Lipoprotein molecules. This membrane encloses the Neuroplasm. Each cell (Fig. VI, 3) has a large bag like cell body or Soma containing a large Nucleus which is often located centrally. From the Soma are given off a varying number of cytoplasmic processes that differ in length and diameter. Most of the processes of a single soma are short and fine, measuring in general less than 1 mm in length and 5 or even less in diameter and terminate in still finer and minute arborizations. These are called as Dendrites. There is another usually very much longer and thicker process, the Axon that may even reach a length of 1.0 meter and 250 in diameter. The Axon in its turn may branch off to the sides giving rise to collateral branches during its course and these may establish connections with other nerve cells or their branches. The axon finally terminates in a cluster of fine branches termed Teledendrites or they may even be absent. Nerve cells without processes are referred to as Amicrine cells.

The Axon is covered over for purposes of insulation by a fatty layer or Myelin sheath secreted by the Schwann cells. The continuity of the Myelin sheath is interrupted by naked regions called nodes of Ranvier. Dendrites, Soma and Teledendrites, as well as small nerve fibres of some of the animals, are completely naked and do not possess any Myelin



investment. Such fibres are referred to as Non-myelinated fibres in contrast with the Myelinated fibres.

Nerve cells are classified into Unipolar, Bipolar and Multipolar types and these are variously distributed in the different regions of nervous system. The variety of subtypes known far is endless. Large to giant nerve cells some with relatively abundant Neuroplasm containing large nucleus exhibiting little chromatin on one hand can be contrasted with minute nerve cells containing a very thin layer of cytoplasm, if at all, that surrounds the densely chromatic nucleus on the other. In their advanced form they are called Globuli cells and occur in closely packed masses. Similarly, the receptive or Dendritic pole and the efferent or the Telodendritic pole exhibit several variations.

Recent advances have shown that the nerve cell need not be active in its entirety but on the other hand it consists of several or many regions of different functional capacities, and parts of it come under activity at any facultatively interacting in complex ways.

When a nerve cell is stimulated by a stimulus of the right magnitude or strength an All-or-None and a very brief change in the electrical potential charge of the nerve membrane takes place as due to the dynamic shift in the electrochemical gradients of the ion systems present inside and the outside of the nerve cell. The potential charge which is positive outside of the nerve membrane changes to negative due to influx and efflux of certain ions especially sodium and potassium ions across the nerve membrane from Blood Plasma to the Neuroplasma, and in the reverse direction respectively. This change in the potential can be measured as an electrical pulse of few millivolts (Millivolt 1/1000 of a volt) in strength and exists for periods of 0.3 to 10 milli seconds (Milliseconds 1/1000 of a seconds) and is known variously as Spike potential, Action potential, a Coded message or All-or-None impulse or a nerve impulse. Depending on the persistence of the stimulus this nerve impulse production can be repeated from a few or dozens of times to hundreds of times during a second and this constitutes the frequency pattern of the coded message. After having been generated this All-or-None nerve impulse invades the neighbouring regions of the nerve fibre successively and gets propagated along the entire course of the Axon in a frog leap' or a saltatory fashion from one node to another node of Ranvier without undergoing any decrement as due to lapse of time and space. These quantal pulses in the Axons are the only means of conducting excitation over long distances. After reaching the end of Teledendrite which impinge on another nerve cell the nerve impulse, so to speak causes a series of molecular changes in the infinitesimally minute gap or bridge or synapse that result in the production of minute electrical pulses called synaptic potentials. These potentials once again generate the nerve impulse after a minute delay called the synaptic delay which is of the magnitude of 0,2 milli seconds. This process is repeated all along the course of the nerve till the impulse reaches its destination in the Nervous system. This type of conduction of messages from Denditic pole to the end of the Axonal pole of the nerve, segment by segment, is known as Orthodromic conduction,

That nature's ways are highly mysterious is more than amply demonstrated in the phenomenon of the production of nerve impulse. A nerve cell containing a colloidal solution of organic and inorganic salts dissolved in water and covered over by double layers of fat and protein is capable of producing a tiny bit of bioelectricity. This capable of travelling

all along the length of the nerve cell drawing the required energy from the nerve cell itself.

The dimensions of the Axon of the nerve cell decide the velocity of the conduction of the messages. The greater the dimensions of the Axon, the greater the speed of conduction and hence the lesser the time taken for the message to reach the destination. Taking up the entire gamut of the dimensional variability we find big sized or A category, medium sized or B category and small sized or C category of fibres which convey the messages in different times to the integrating centres. Certain metabolic and pharmacological conditions can enhance or decrease the velocity of conduction or even block the messages completely.

The Axon along with the Schwann cell, Myelin coat is invested by a fibro-elastic sleeve and the sleeves of adjacent Axons bind together forming a compact mass of nerve fibres and connective tissues to form a nerve fasciculus. Several of these fascicles varying from 1 to 60 or even more are again packed with a supporting matrix of a host of cells like fat cells, collagen cells and connective tissue fibres forming different coats called Endo, Peri and Epineurium located one over the other along with the highly complex system of capillary net work of nutrient blood vessels. The finally formed big unit is what is commonly known as a nerve and it is highly elastic owing to the fibroelastic components that have gone into its make up.

A peripheral nerve can be purely sensory or purely motor maybe it is a mixture of both sensory and motor fibres the distinction being purely one of function rather than of anatomy. In the sensory nerve the direction of message conduction is from peripheral sense organ to the central integrating organ, whereas in the motor nerve it is from the central integrating organ to the peripheral effectors. Thus, the movement of the impulse traffic may be either centrifugal or centripetal.

Early Development:

The ectoderm of the embryo develops in its mid-dorsal region an infolding called the neural groove (Fig. VI, 11). This groove closes

dorsally, giving rise to the neural tube which as the development proceeds separates from the rest of the embryonic ectoderm (skin) while its walls thicken leaving a very narrow canal internally. This tube at its head end expands and forms three dilatations or expansions called Fore (Procen-), Mid (Mesen-) and Hind (Rhomben-) Brain (-cephalon) while the rest of the tube forms the Spinal cord (Fig. VI, 12). The anterior thickenings become asymmetrical leaving large spaces that form the cavities or ventricles of the adult brain. A constriction divides the Prosencephalon into Telencephalon and Diencephalon while similarly Rhombencephalon is differentiated by another groove into Metencephalon and Myelencephalon. Two prominent flexures (Cranial and Pontile) of the brain appear twisting the divisions of the brain around its axis till the final positions of the adult are attained. The Cerebral Hemispheres are developed from the Telencephalon, the first, second and third divisions of the brain stem are developed from the corresponding vesicles of the Diencephalon, Mesencephalon and the Metencephalon respectively, while the Myelencephalon gives rise to the fourth division or the Medulla oblongata. At the region of the Rhombic lip of the Pontile flexure the Cerebellum develops and eventually becomes dorsal to Pons and Medulla oblongata. (Fig. VI, 13).

The single and the continuous mass of nervous system of the adult can be divided for purposes of comprehension into (1) Central including the Brain or Encephalon and Spinal (nerve) cord or Medulla spinalis and (2) Peripheral divisions containing the Cranial and Spinal nerves and the numerous ganglia and plexus concerned with the visceral innervation (Autonomic). The C.N.S. includes all neural structures that are located inside the cranial cavity and the vertebral column. The following gross divisions can be recognized in the brain proper. Cerebrum, Rhinencephalon, Basal ganglia, Cerebellum and the Brain, Stem consisting of Pons and Diencephalon, Mesencephalon, Medulla oblongata. The average weights of the human brain in adults are as follows : about 1,450 gm. In males (1,240 to 1,680) and 1,350 gm. In females (1,120 to 1,510). It is large and the weights of the body and brain are on an average in the proportion of 50: 1.

Peripheral Nervous System:

Spinal nerves (Nerves given off from the spinal cord) consist of the sensory (afferent) and motor (efferent) nerve fibres of the limbs and trunk of the body while the nerves given off from the Brain or Cranial nerves consist of the sensory and motor nerves of the head region. Of the 12 cranial nerves some have both sensory and motor fibres while others have mainly motor or sensory fibres. Spinal cord gives off 31 pairs of nerves, each composed of a dorsal and ventral root consisting of series of filaments given off from the cord along the vertical furrows on the side of the spinal cord. Each dorsal root exhibits a swelling called the Spinal Ganglion (Fig. VI, 8). The dorsal root consists of afferent or sensory fibres connecting the sense organs of the body while the ventral root is made up of efferent or motor fibres running to the motor organs. The cord is incompletely divided into symmetrical halves of septa (an anterior and a posterior) in the middle region. The central part consisting of Grey Matter is distinct in the form of a 'H' and is surrounded by white matter. The spinal cord comprises four major tracts columns of nerve fibres running vertically and communicating to the brain. The tracts between different levels of the cord and different brain centres are distinguished in terms of the region they connect. The cells of the sensory and motor columns make exceedingly complex interconnections.

Autonomous Nervous System:

Motor fibres innervating viscera are present in many spinal and cranial nerves. These fibres, instead of supplying the viscera directly, end in peripheral ganglia of the Autonomous or Visceral nervous system. These ganglia may belong to the Sympathetic (Thoracolumbar) or the Parasympathetic (Craniosacral) systems. Extending from the base of the skull to the end of the vertebral column is a series of ganglia forming a nerve trunk alongside of the vertebral column. This nerve trunk consists of 3 pairs of ganglia in the neck, 10 pairs in the thorax and several in the abdomen and pelvis, constituting the Sympathetic chain of ganglia or the Sympathetic system. Motor fibres synapse in the Sympathetic ganglia and from these ganglia new post ganglionic fibres arise which in their turn innervate the viscera by forming extensive network around them. Parasympathetic ganglia are not organized into any nerve trunk. Instead, they are located near the organs they innervate.

Post ganglionic efferent of both Sympathetic and Parasympathetic systems act on viscera by liberating neuro-humoral secretions. The influence of these two systems on the viscera they innervate is antagonistic, i.e., opposing each other. Generally, Sympathetic efferent liberate Adrenaline while Para-sympathetic efferent liberate Acetylcholine. Hence these fibres are referred to as Adrenergic or Cholinergic respectively. Sympathetic activity prepares the body for exerted and increased action such as is needed in an emergency while Parasympathetic activity causes recuperation and reestablishment of the normal or ideal state. The autonomous system is concerned with the involuntary activity of the viscera and maintains a stable internal environment or Homeostasis.

The Spinal Cord:

The bony arches of the vertebral column form a tube, the vertebral canal, and through this runs the spinal cord. It is continuous with the Medulla oblongata of the brain and emerges out of the skull through the opening (Foramen Magnum) at the base of the skull and extends down to the lumbar vertebrae of the caudal region running parallel to the long axis of the body. It measures about 18 inches in length with a calibre of a thick pencil and is the oldest and the simplest part of the nervous system. It is a long cylinder with two enlargements, one in the region of the upper limbs (cervical region) and the other in the region of the lower limbs (lumbar region) It is covered over by three envelopes or meninges, a thicker outer one the Dura Mater, and two inner ones the Arachnoid and Pia, Mater which closely adhere to the spinal cord (Fig. VI, 9). The space between the Arachnoid and Pia Mater is called the cerebrospinal space and is filled by the cerebrospinal fluid which acts as a cushion and shock absorber for the spinal cord. A small canal located in the centre of the spinal cord is known as the spinal or central canal and is continuous with the greatly enlarged cavities or ventricles of the brain, and is filled with cerebrospinal fluid.

A naked eye inspection of the properly fixed, unstained tissues of the central nervous system will reveal that its substance is characteristically distinguished into white and grey matter. The white matter is made up of the Myelinated nerve fibres. Fatty Myelin sheath of

these nerve fibres is responsible for the whiteness of the tissues. It is seen forming the exterior of spinal cord, the big tracts and the commissures of the brain stem and fore brain. Grey matter, on the other hand, consists of cell bodies of the Neurons and Glial cells and their processes. The Myelinated fibres are absent or only partly represented. Aggregation of grey matter are found in the centre of the spinal cord, in the nuclei of fore brain and brain stem and in the cortical layers of the Cerebral Hemispheres and the Cerebellum. Generally, the Brain centres are represented by grey matter where synaptic relations are established between the Afferent and Efferent fibres, while the path-ways or tracts or private lines connecting up the centres and the centres with the afferent or efferent structures are formed by the white matter. In the simplest of the neural unit two neurons participate: one primary and sensory (Afferent) nerve cell that can respond to the stimuli and transmit the signal to the other, the final motor, efferent nerve cell which brings about the motor action or the required response. This simplest unit forms what is called the Monosynaptic Reflex Arc (Fig. VI, 10). In others complexity is introduced by way of participation of a greater number of nerve cells both sensory and motor, which synapse with internuncial nerve cells, thus forming polysynaptic pathways.

Brain:

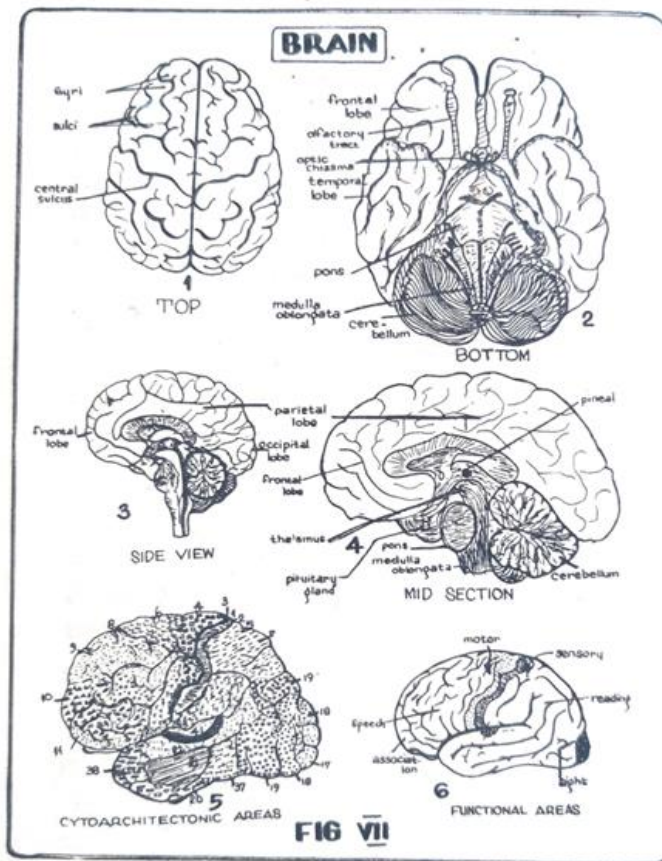
The most striking feature of the human brain (Fig. VII) is the inheritance, during the course of man's evolution from the reptilian stock (over the last 200 million years), of the structure and organization of three basic cerebral types which have been called the reptilian brain (Archaeopallium), the old mammalian (Palaeopallium) and the new mammalian brain (Neopallium). Koestlers's hierarchial concept of a 'Holon' refers to each of these divisions with ramifications and reticulation both in the horizontal and vertical planes resulting in holanarchic organization of the entire brain. All these divisions interconnect and function together despite their great differences in structure and chemistry.

The basically reptilian brain or the Archaeopallium becomes the oldest heritage in man and includes the brain stem, much of the Reticular system, Mid-brain and Basal ganglia. The old mammalian brain or

Palaeopallium is synonymous with the 'Limbic' or visceral brain. It is structurally primitive as compared with the Neocortex and functions at the animalistic level in man as in other animals and is connected to the Hypothalamus which plays a fundamental role in the integration of emotion, and viscerosomatic behaviour, and endocrine functions. The Neocortex of the Neopallium reaches its zenith of development in man making it the brain of speech, learning, reading and writing, etc. (Fig. VI, 1, 2, 3).

The spinal cord merges without any sharp distinction into the Medulla oblongata which is a 3 cm. long stalk-like terminal part of the brain. The upper part of the hind brain consists of a diamond shaped expansion of the small central canal and is known as fourth ventricle. This contains the cerebellum as its roof and pons as the floor. Medulla oblongata represents an enlarged and modified version of the spinal cord. Retaining some of the characteristic features of the spinal cord, it exhibits entirely new and large groups of nuclei in which some of the larger ascending columns of the nerves from the spinal cord terminate and these nuclei in their turn give rise to large fibre tracts. A distinct eminence on the ventral part of the Medulla is called the Pyramid. It consists of the great mass of motor tracts descending down from the cerebral cortex to decussate in this region. Pons is located in front of the Medulla oblongata forming the floor of the upper part of the hind brain and exhibits median groove flanked by prominent elevations on either side. It is characterized by transverse striations and continues into the thick strands of the middle Cerebellar peduncles.

The Cerebellum lies in the lower part of the back of the skull and is attached to the dorsal part of the hind brain forming its roof. The central part, the Vermis, lies in between the lateral Cerebellar hemispheres whose substance undergoes extreme folding. It is covered over by Grey matter forming its cortex or the external surface while the white Cerebellum matter is located internally regulates varied motor activities of the body by means of complex feedback circuits playing a crucial role in maintaining equilibrium and in the control of precise muscular movements.



The mid brain is approximately 2.5 cm. in length and is concealed from view by the overhanging Cerebral hemispheres (Fig. VII, 4). It contains a narrow canal called the Aqueduct which connects the fourth ventricle of the hind brain with the third ventricle of the fore brain. The dorsal portion exhibits four rounded eminences called the colliculi which are concerned with vision and hearing. The ventral region of the mid brain consists of the cerebral peduncles which are very prominent strands of white matter formed by the descending fibres, Reticular formation and several large motor nuclei.

The studies on the physiology of the central nervous system during the Edwardian period were mainly centred round the reflex functions of the spinal cord, below, and upon the sensorimotor activities of the Cortex, above. Obviously owing to difficulties of approach to its buried and deep-seated positions the intervening stem of the brain was mostly unattended. It is only in the recent times that attention was paid to the brain stem,

thanks to the development of the stereotaxic instrument by Sir Victor Horsley and R. H. Clarke. A large matrix of nervous tissue extending from Medulla through the base of the mid brain into the Thalamus forms a nonspecific pathway and is called the Reticular formation. Much of the central core of the brain stem is occupied by this Reticular formation and consists of nerve cells interposed between bands of nerves fibres. A large fraction of cells of this formation receives and also responds to the input from the afferent fibres of different and highly varied modalities from a large area of the body, by way of their collaterals. As a result, the physiological influence of this central Reticular system radiates, as it were, in a number of directions.

Output from the Reticular formation goes partly (1) down and caudally to the spinal cord to regulate the sensory and motor activity, and the spinal reflexes controlling posture, (2) ventrally and rostrally to the Hypothalamus and Pituitary gland which in their turn influence the visceral and endocrine functions through humors and hormones that may once again act on the Reticular formation in addition to the other organs, (3) upward and cephalically to the Diencephalon and Rhinencephalon (Limbic brain) to influence the mechanism for emotion, reward and punishment and (4) more upward and more cephalically and still dorsally to the Neocortex of the Cerebral Hemispheres which, along with the Thalamic and Basal ganglionic masses, influences the higher sensory, motor and intellectual process. The activity of the Reticular formation reaching the Neocortex influences the latter to a profound extent and hence this part of the Reticular system is called the Reticular Activating System because when its activity reduced by pharmacological agents, stimulation, ablation, etc., as in sleep the animal loses its consciousness. It is of importance to note that stimulation can cause either arousal or sleep depending upon the site of stimulation. Hence this Reticular Activating System is regarded as a gateway to consciousness while the Reticular system constitutes the very seat of consciousness (Magoun 1958). Maintenance of wakefulness and focussing of the attention result from the Ascending Reticular activity exerting upward upon the Neocortex. Unless the tonic (non-adaptive) and nonspecific influence of this diffuse network of Reticular system is present, the sensory input reaching the cortex along its usual pathways is not consciously reacted to and cannot be assimilated.

Every organism exhibits several behaviouristic patterns during its everyday life. Thus, most of the muscles and other organs of the body can be involved in several distinct reflex actions. They may be working in different ways during different behaviouristic patterns. Magoun and his associates at the University of California have named the Reticular formation as the Brain's response selector. The activities of the Reticular formation is more widespread than those of the specific centres of the brain and a number of important functions like circulation and respiration are controlled by this Reticular system. It is capable of grading the activities of the most other parts of the brain and serves importantly, and in collaboration with the Neocortex, in the Central Integrative process of the Brain.

Forebrain contains a central part, the Diencephalon and two extremely large lateral expansions, the right and left Cerebral Hemispheres. The cavity of the Diencephalon, called the third ventricle, communicates with the lateral cavities of the Cerebral Hemispheres. The Diencephalon exhibits Thalamus on each side, the Hypothalamus along with the groups of nerve cells or nuclei which are associated with the ascending fibres that run into Cerebral Hemispheres, the Optic Chiasma, the Infundibulum, the Pituitary gland and the Mammillary bodies on its floor. The roof of the Diencephalon contains the Pineal gland which was regarded by Descartes as the seat of the soul, and its functional significance is not yet unravelled even at this juncture.

Thalamus acts as an integrative centre for input from all the sensory systems. It is a relay structure conveying sensory information to the concerned parts of the Cerebral Hemispheres and routing motor information in the other direction to the spinal cord and other organs. A large number of channels of information from almost all the major sensory systems excepting olfactory system and most part of the Cerebral cortex, the Corpus Striatum, Cerebellum, Hypothalamus and Reticular formation converge and impinge their activity on the Thalamus thus involving it in all the activities of the major subdivisions of the Central Nervous System. Owing to the profuse interthalamic networks the information of extreme diverse nature interact and are integrated and the resulting pattern of synthesis of much greater range and complexity diverge on to several destinations. The Thalamus influences the Cerebral Cortex and other important integrating centres of the brain, reciprocally. The ventrally located group of nuclei forming the Hypothalamus is a highly developed

primitive integrating centre, controlling several forms of complex instinctive behavioural acts like emotion, thirst, hunger, rage, sexual urge, pain and pleasure. It also plays a very important role in many of the regulatory functions of body like the production of the all-important pituitary hormones, sensing and regulation of the deep body temperature, and helps to control the osmoregulation and salt-water balance of the body fluids. It helps in mobilization of the energy during emergency situations.

Recent experiments involving the stimulation or the Ablation of the Hypothalamus have revealed that it is intimately connected with several important activities. These are (1) Endocrine control: Formation of release or release inhibiting factors influencing the production of a large number of hormones by the cells of the pituitary gland. Some of these influences the target cells in the body in a direct manner while others require the intermediation of another endocrine organ like thyroid, Adrenal cortex Or Gonads. Neural pathways converge on to the Hypothalamus and the integrated information modifies the production of substances by the Hypothalamus, (2) Neurosecretion of hormones into the blood stream directly, (3) General Autonomic affects such as cardiovascular, respiratory and alimentary control is exerted; (4) Temperature regulation : It is a central regulating mechanism for the critical equilibrium between the overall production and loss of heat of the body, (5) Control of water and food intake; water balance of the body and the osmoregulation of the blood are partly controlled. A thirst or drinking centre is located in its lateral part and this regulates the water intake. A laterally placed hunger or feeding centre compensated by a median 'Satiety' centre have been regarded as bringing in a balance or imbalance between over-eating or Hyperphagia leading to obesity and Hypophagia or even total Aphagia resulting in death from starvation, (6) Sex and reproduction : Several aspects of reproductive physiology like the formation of gametes, maintenance of Oestrous cycle (monthly cycle in females), elaboration and perpetuation of secondary sexual characters, receptivity of the male by the female, mating behaviour of male, are well under the control of Hypothalamus. Further, though the basic drives associated with search for and procuring a mate, food and drink, territory establishment, and raising the young, etc., may arise in Hypothalamus, a mutual interaction with the Limbic system of the brain is also needed for their complete

integration into a complex pattern of behaviour involving a train of reflex acts, (7) Biological clocks : Many functional activities of the body like the regular fluctuations of body temperature, several secretions, concentration levels of blood plasma constituents, sleep and wakefulness with the attendant shift in the production of characteristic rhythms of brain waves, etc., exhibit a cyclic variation. This cycle approximates a day or 24 hrs. and is called the Circadian Rhythm. Hypothalamus exhibits an overall control in many of these rhythms, (8) Emotion, fear, rage, aversion, pleasure and reward: The emotional behaviour of the individual consists of a conscious subjective feeling of the sensation and another physical and objective expression in the form of emotion. For a complete integration of these states the participation of the Hypothalamus, Limbic system, Prefrontal cortex is quite necessary Stimulation of the positive reward centre of the Hypothalamus in man leads to a general sense of wellbeing with an occasional erotic content or gratification of an intense drive, while the stimulation of negative reward centre causes physical pain or displeasure, and complex patterns of behaviour are evinced to avoid stimulation of the negative centre. Occupying the most part of the cranial cavity and forming the largest mass of the human brain is the Cerebrum. This is structurally most complex and is partly divided into left and right lobes or Hemi-spheres by a dorsomedian deep cleft. The two halves of the Cerebrum are interconnected by bands of white fibres forming the Corpus Callosum. The surface of the Cerebrum is highly convoluted by a special process of infolding throwing the surface into a number of irregular folds or eminences. Fissures or sulci separate the folds from each other. Most important is the central sulcus which differentiates the anterior motor areas of the cortex from the posterior sensory areas. Highly individual variations in the topography of the Cerebral Hemispheres can be noticed despite a more generalised and common plan of construction. While the entire substance of the Cerebrum is a continuous mass of nervous tissue it is differentiated for descriptive purposes into lobes of the front (Frontal lobe), of the sides (Parietal lobe; Temporal lobe) and of the back (Occipital lobe).

In its cytoarchitecture i.e., the thickness of its cortex, the exact arrangement and the nature of the nerve cells, located at different parts, the cerebrum exhibits large diversity (Fig. VII, 5). Based on its structural characteristics a cytoarchitectural map of the cerebrum is prepared.

These cytoarchitectonic differences of the several regions of the cerebrum have been experimentally found to be exhibiting physiological differences of great functional significance (Brodmann, 1909). Thus, each of these areas is given a number and corresponds to visual, auditory, Somaesthetic projection areas and to motor areas of the cortex.

The cerebral hemispheres contain white and grey matter. The white matter, located internally consists of afferent (corticopetal) and efferent (corticofugal) nerve fibres that connect the Cerebrum with the rest of the C.N.S. The grey matter, of several milli-meters in thickness consists of many cellular layers traversed by fibres running in different directions. The nerve cells of the grey matter exhibit great diversity and some of them are highly specialized. The Neocortex acts as a radar screen where the sensory and motor information is projected on by the fibres from various centres of the brain.

It is well known that the cortex exhibits topographical or myotopic representation of the body surface. Different points or areas of the cortex control specific motor or sensory activities of the body parts. This topographical representation of the body parts in the cortex does not follow the familiar proportions of the body parts, instead, some parts are largely represented in comparison with other parts. In man considerable representation is given to the thumb and digits and the region of the mouth especially the lips which are involved in speech function. Other regions like trunk are less represented. This cortical representation of the bodily parts drawn as a figure gives what is called the Homunculus in case of man (Fig. VIII).

It is obvious that information concerning the environment is conveyed by the sense organs like eye, ear, nose, tongue, skin, and muscle, for example, to the concerned integrating centre in the brain along specific routes called Optic, Auditory, Olfactory,

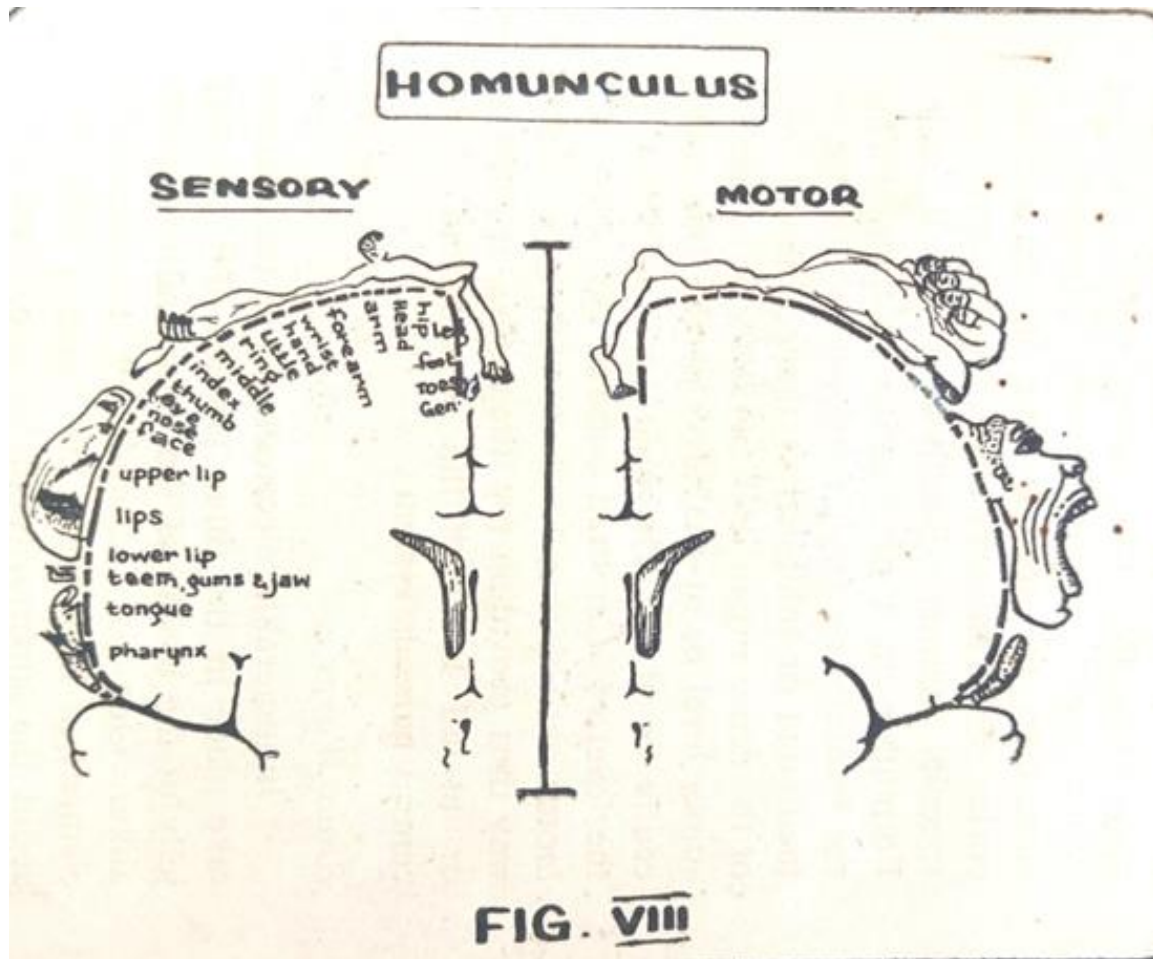


FIG. VIII

Gustatory. Tactile and Proprioceptive path-ways (Fig. IV, 14). From the concerned centre most of the sensory information is routed to the specific area in the cerebral cortex via Thalamus and Hypothalamus in a specific manner directly or via Reticular Formation in a non-specific manner. Thus the information from the sense organs can be facilitated or inhibited at the peripheral level of the sense organ itself or at the intermediate spinal level or at the level of the integrating centre or at the Thalamic level or finally at the level of Cerebral cortex. So also, the motor activity can be dealt with in a similar way thus providing for integration at different or at all levels of the organization of the central nervous system.

Brain Waves:

Innumerable electrochemical transactions take place in the three pounds of pinko grey jelly of the brains of the saint and the savage alike. One is inspired by the immortal element in him while the other is concerned about the superiority of his ego, resulting in sublime creation leading to realization, or to murder and untold suffering to others, respectively. Despite the difference in personality and the nature and content of actual thoughts that pass through the cortex, we can detect in normal human beings, some outward signs of these electrochemical processes as minute electrical waves and pulses on the scalp. This electrical activity from a considerable area of brain can' be recorded by electrodes placed on the skull, or the electrodes can be inserted through an aperture in the skull on the surface of the brain for better recording. Such electrical effects of the brain are called brain waves and these are minute, highly complex, incessant and often rhythmic. The origin and functional significance of these minute electric surges, whirl pools and ripples is not yet known.

Thus, human brain exhibits tiny amounts of Electrical potentials and these brain waves have been successfully recorded in 1929 by Berger, though the fact was reported earlier in 1875 by Carton. Since then the recording technique, involving specially designed and sophisticated machines, is known as electro-encephalograph (EEG) and the inked record is called the Electroencephalogram (EEG). Highly complicated machines enable the brain waves to be recorded simultaneously from many different areas of the brain. Further analysers and computers enable us to analyse and interpret the data. The description of the brain waves and the subsequent analysis takes the following characteristics of the potentials into consideration: Amplitude, frequency, (Rhythm) and Asynchrony (Arrhythmic). An Alpha wave is a typical one recorded from the visual cortex of the occipital lobe of the brain of a resting adult individual with eyes closed. This is a typical Low frequency (8 to 14 cycles or 10 to 12 per second) High amplitude (50 milli volts) and well synchronized wave (High voltage, slow rhythm or H.V.S.). Activation or Arousal? Of the cortex by any sudden stimulation such as for instance the opening of the eyes changes this synchronised Alpha pattern or H.V.S. into a desynchronised, Low amplitude (5 to 10 milli volts), Higher frequency (15-60 cycles/sec) pattern, Low voltage, Fast rhythm or L.V.F.

and this is called Beta wave. These H, V.S. or L.V.F. patterns and Delta rhythms (1 to 5 per sec: 20 to 200 micro volts) are seen in normal adults, while at birth and infancy only Delta and: Beta rhythms are seen. Grey Walter identified slower Delta rhythm in 1936 as related to interference by thalamus and injuries. These waves surge over the whole brain during deep sleep of a normal person and block the activity. Theta rhythms are connected with thalamic tumours, mental disturbance and epileptic seizures. Though Alpha rhythm appears at the age of 9 years it is only at the age of 17 or 18 that the typical adult alpha rhythm sets in.

No two Individuals have the same pattern of EEG since the thinking and acting is never the same in these two individuals, Further, variations in EEG commonly occur even in the same individual at different times even under the same conditions. States of alertness, anxiety or fear, etc., associated with increase in frequency and diminution in amplitude of the potentials. Sleep is characterized by a decrease in both frequency and amplitude of the waves while abnormal states like epilepsy produce a barrage of high amplitude waves. The pattern of Alpha rhythm at 10 per sec. is highly individualistic. This rhythm, often referred to as brain signature, is never exactly the same in two individuals and is related in some way to vision. It is largest and most regular at the back of the head. It is most prominently exhibited with closed eyes and blank mind. When the eyes are opened activating vision or when the brain is engaged with a problem this rhythm is usually disrupted and disappears altogether. However, variations like total absence of Alpha rhythm with blank mind and closed eyes or the persistence of rhythm when the eyes are opened and even while reading are observed. The Alpha waves appear to be waves sweeping regularly over the cortex from front to back while in mentally disturbed people the direction of the sweep may be reversed.

Walter (1974) suggests "that the Alpha rhythm may be the outward sign of a process whereby incoming and outgoing signals are gated and synchronized so as to ensure a systematic distribution of information and action throughout the higher nervous system ". The intrinsic rhythms of the brain are regarded as traffic regulators. No direct correlation has as yet been established between the different varieties of thoughts that pass through any brain and its rhythms.

Special sense organs discharge spontaneously into the integrating centres even in the absence of any apparent stimulation as in sleep, and this is fed into the cortex resulting in the production of brain waves. Active stimulation of the sense organs brings a barrage of signals along the specific sensory pathways to the concerned brain centres and from here the activity is projected on to the Neocortex either directly or through the Reticular activating system or jointly by both, and the cortical neurons in their turn experience stimulation resulting in the production of evoked potentials. Reticular activating system has been shown to play a crucial role in the control of the state of excitability of the cortex (local and general) either by facilitating or inhibiting the reception of the sensory information reaching the cortex. The EEG has important clinical application and any malfunctioning due to disease or damage of the brain tissue can easily be diagnosed.

HIGHER CEPHALIC FUNCTIONS

The intelligence of an animal is directly correlated with the size of the Frontal lobes of the Cerebrum of the brain which in its turn is a function of the evolutionary level of the organism. Thus, the Frontal lobes of the Cerebrum are well developed in the highly evolved organisms and it reaches the zenith of development in man. The Frontal lobes are regarded as the seat of intelligence of the animal and the organ or centre of the mind in man. The prefrontal area of the Frontal lobe is regarded as a region of relatively high synthetic or associative faculties and it is known to be concerned with emotional feeling. Removal of this area either due to accident or experimentally causes Frontal lobe syndrome which is characterised by major changes in the personality of man, turning him into a bad citizen and a social risk to the country.

Information concerning the external world reaches the brain through several sources and channels like visual, auditory tactile, olfactory, Proprioceptive, etc. (Fig. IV, 14). This information or knowledge reaches the Occipital, Temporal, and Parietal lobes and is stored there. These

primary areas which are many in number are interconnected and linked together profusely by way of tracts of association fibres, thus relating sensations of diversified nature and also synthesizing more complex traces of memory. With the passage of time and repetition of different patterns of experience greater and greater intricacies of patterns are etched into the fabric of the brain. Our memory traces or Engram are stored in the entire Cerebral Cortex of the brain. Learning and memory (Mnemonic) processes are not confined to any specific system of the brain, but are general properties of the entire neural system. These are time dependant. The mental capacities of the individual is the function of the whole unit of Cerebral Cortex rather than of any portion thereof and depend on the combination of internal and external experiences.

The neurophysiological mechanism under-lying the learning behaviour of man is extremely complex and hence no single all-embracing theory of learning has gained acceptance despite several theories of the past. The problem of human memory, though extremely fascinating and enchanting, is very little understood since the exact changes that take place in the C.N.S. constituting the memory trace Engram, are least understood.

At the dawn of this century Muller and Pilzecker (1900) proposed the existence of neuronal preservative process of the experiences. This process takes place in two stages: an initial and a final stage. In the first or the initial stage the memory is short lived or evanescent and is lost very easily and could be influenced by external events easily. The exact nature of events that would take place during this initial or consolidation phase in establishing the engram is unknown. However considerable evidence is forthcoming that repeated excitation of nerve cells in the cortex in a closed (reverberatory) circuit results in the retention of memory till such time the permanent process that fixes the memory trace indelibly on the cortex takes place. Even after the environmental stimulus has ceased the neural consequences of a single experience persist for a considerable time in the form of reverberating impulses. The nature of the electrical activity involved remains unknown although All-or None impulses passing through reverberating circuits represent a possible mechanism for the initial imprinting of short-term memory. There is no conclusive proof that consolidation of memory depends on the reverberating impulses of All-or-

None type. Electrical activity other than this type may be equally important for the consolidation of memory. In the later or second stage the memory is more permanently or stably fixed, though the nature of this stable and long-lasting phase of the memory is not yet fully understood. Hyden (1959) proposed that intracellular protein synthesis involving Ribonucleic acid (RNA) plays a vital role in this long-term memory trace. Experimental evidence points out that the Hippocampal zone in the brain is the site of recent memory while the long-term trace is not confined to any specific area or exclusive part of the brain but on the other hand is resident in and is widely distributed throughout the N.S. and stored in several loci in the normal brain.

A large number of fine sets of muscles (like respiratory, laryngeal, lingual, pharyngeal and labial) take active part in the production of words and make a man to orate. Certain vibrations, sounds, and words associated with visual or tactile or auditory or other types of sensations quite early in infancy and are stored in the brain as memories of the experiences. Simultaneous fixing of every single symbol in the worlds of both internal and external perceptions is achieved. This constitutes the very first step in the development of speech in man. Next comes the attempt of the infant to produce sounds (words) by way of imitation of the words and their production takes place only when the pathways between the auditory area of the Cortex and its motor area and the muscles of articulation are established after the definite meanings of the words have been imprinted in the brain. The verbal expression of words involves the coordinated movements of several sets of muscles. Finally, when the child is being taught to read, association between auditory and visual symbols of speech takes place: This, through association between these areas of cortex and the motor area for hand (thumb and fingers in particular), leads to the learning of the child expressing the auditory and visual impressions in the form of a written word. Thus, speech becomes frozen in time and space to produce writings of a particular era. This faculty of speech has intricate neural mechanisms underlying it. The speech defects are mainly of verbal, synthetical, nominal or semantic types and each One is associated with lesions or disorders of specific regions of the speech area in the Cortex. The most unique feature of the human brain is the phenomenon of cerebral dominance. In the adult the capacity for speech is controlled by the temporal speech area of the left Cerebral Hemisphere.

This region on the left side is longer and larger by 1/3 than its fellow on the opposite side.

Despite innumerable attempts by the keenest of the intellects of our race to unravel the mysteries concerning the nature of the thinking faculty, the genesis and the very nature of the thought remain to elude, our understanding and is still an enigma, at best, thought can be defined as a Bioelectrochemical event of an infinitesimally small magnitude both in duration and in expanse confined the geometrically oriented, localized nerve cells of the Cerebrum. These cells are interconnected such that a complex nexus of a reverberating circuit is formed and the phenomena is dealt with in a spatiotemporal order. The very process involved in the symbolization and abstraction needed for the conceptualization, and resulting in the formation of a specific type of consciousness, are least understood and are considered to be the outcome of the integrative interactions that take place in the brain at large and Cerebral hemispheres in particular. Mind or Chitta, most commonly used term in day-to-day affairs, in psychic and in yogic literature in particular, may be regarded as a total and subtler outcome of these integrative interactions. It is the bridge between the body physical and the body psychic. It is through the control and manipulation of this subtler and volatile entity that the. Physiology and psychology of a person are brought under control. Neurohumoral axis-involving the Cerebral Cortex, Thalamus, Hypothalamus, Reticular formation, Hypophysis and Adrenals are directly involved in the higher functions of the brain. These organs and their influences are restricted exclusively neither to the body nor to the mental faculty (or mind). The objective-biological study of human personality in the social environment as envisaged by- Human Reflexology, a scientific field of study developed in Russia (Bechterev, 1932), maintains that it is not consciousness which determines existence, but on the other hand it is existence which determines human behaviour or consciousness. Jackson following Spencer maintained that man is intelligent and conscious, while animals are not so (?). He distinguished subject consciousness from object consciousness. In the widest sense the first represents the awareness of self while the second is that of environment as interpreted by the self. At present the word consciousness is related to the knowledge of the activating effect of the brain stem reticular formation which confers on the organism a flexibility of attention and response closely related to the

changes in the environment, both internal and external. This integrating mechanism located in the brain stem manipulates the states of consciousness and is indispensable for the initiation and maintenance of waking consciousness. Discretion, constant vigilance and above all continued practice will help an individual to train his thoughts in any specific and chosen manner. With proper training, thoughts function in a coherent and purposeful manner instead of running wildly in every direction and dissipating the energy. This control and mastery over thoughts results the acquisition of will without which any special endeavour on the part of man cannot be a success. As in material pursuits, special will helps one to tread on the path of spirituality with ease and composure and without any set back.

The Interrelated problems of matter and spirit, body and soul, body and mind represent different levels of metaphysical organizations. The spirit is related to matter as is the soul to the body, in the same manner as the mind is related to the physical body. Equally important, if not more, is the dichotomy between the Master organ- of the body, the brain, and the volatile, abstract governor of the body, the mind. That the mind has the brain (or Nerve cell or synapse) as its substrate or the physical basis the crux of neurological thinking since a few centuries' past is an established fact though in certain philosophical and mystic quarters the mind is relegated to the heart for its material base. However, the exact relation between the abstract mind and the physical brain remains, and probably will always remain, a major, unsolved and verily a mysterious problem in the realm of Bioscience. Despite the lack of an understanding about the fundamental and basic relations it is becoming more and more evident that both the mind and the behaviour of man are profoundly influenced by known and quite understandable physical and chemical processes that occur in the cellular organization of the body. Thanks to the recent advances, ideas concerning mood, sleep, sexual desires, appetite, aggression and psychosis are formulated. Although the superficial surface has still barely been scratched by the expeditious probes of Neurosciences into the mysterious, unknown and fathomless depths of the human brain and mind in the past decades, we have started to learn about the conscious activity, awareness of self- emotion, motivation, goal seeking innate drive mechanisms, feelings such as pain and pleasure, satisfaction, memory, speech, thought etc. The uniqueness

of C.N.S. lies in its extremely complex networks of the myriads of the intercommunicating nerve cells, which generate appropriate pattern of the response to any given environmental stimuli. Inherent in this highly developed, highly complex, most studied and least understood central apparatus of intermediation between the incoming afferent signals and the emerging subtle arrays of efferent commands to the motor organs is the very basis for the phenomena of learning, memory and consciousness.

However exalted be the status of the human mind that has come into its present glory and eminence during the past millennia of organic evolution, yet it has its own limitations so far as its capabilities are concerned. These limitations are imposed by the genetic endowment resulting in restrictions for comprehending the ever so many- complexities that abound in nature. The human mind lacks the intellectual and conceptual frame work for encompassing the totally unfamiliar phenomena and processes. It is believed that provision is made in the buildup of the brain cortex for plasticity in function or the cortex has an innate capacity for forming new "organs" of perception by establishing new circuits in its intricate and highly complex matrix of nerve cells. The human brain in order to reach the zenith of cosmic evolution has necessarily to develop new psychic functions and dimensions and possibly also new physiological processes which we are not aware of at present through acquisition of new sense organs in the brain that perceive hitherto unknown modalities of stimulations and sensations impinging on the nerve cells in the form of molecular, atomic and sub-atomic forces or may be those impinging in the form of electromagnetic forces or even cosmic forces. Then only would man be able to get over his limitations of frail and slow logic, weak memory, pale abstraction, dull intellect and poor learning, narrower sphere of thought and wisdom, restricted Consciousness and lack of precise expression, etc., resulting in a generation of strong and better equipped human race super man with super consciousness, total compassion, warm heart and all enduring love. The fields of Genetic Engineering and Eugenics at present envisage the rectification and repair of certain defects in human personality though not radically changing the human lot to reach the lofty heights of supremacy of mind over matter.

PART TWO

HUMAN PERSONALITY AND COSMIC EVOLUTION

It is very difficult to define the term 'Personality' which was derived from the Greek word 'Persona' meaning 'Mask'. It can be said to form the very essence of man. It represents the sum total of the behaviour- cum-appearances of man. Personality (Aham) or Ego, is the one that braves and endures the innumerable tests and sufferings of life against the backdrop of the ever-shifting sands of time, thereby attaining permanence and immortality while the very basis of it, i.e., the corporeal body, remains only ephemeral and mortal. The most important component of personality is the Ego or the 'I' ness of the individual which is deeply and securely anchored both in the physical and psychic bodies of the individual. A person has a characteristic appearance, an intrinsic psychic constitutional pattern, and an interacting innate cerebral mechanism that jointly produce a set of personality traits that can easily be discerned or identified from a group of individuals. The brain of a person shapes the interactive matrix and is responsible for the mechanism that goes into the make up of a personality.

Several personality traits have been identified and the list of dimensions of the human personality never becomes exhausted if we consider all the personality traits recognized so far. In an attempt to delineate the dimensions relevant to the problem of human personality, Pribram identifies, on the basis of neurobehavioral and neurophysiological experiments, Effective-Affective dimensions and the Aesthetic-Ethical dimensions along which persons may vary. He finds convergent lines of evidence concerning these dimensions from the observations of others who have identified such dimensions as Extroversion-Introversion; Accommodation-Assimilation; Inner-directed and other-directed. Mostly these physical, physiological, psychological and behavioural traits of the personality represent opposite qualities or pairs (Dwandvas) and constitute the Bipolar scale in the evaluation of these traits. In recent times W. B. Sheldon, after an exhaustive study in the field of constitutional psychology, has identified as many as 650 traits of human temperament and after a series of revisions reduced the number of these traits to 50,

then to 20 and finally to 10 and incorporated them into his scale for rating the experimental subjects. On the basis of extensive experimental studies Sheldon could classify human beings into three basic groups of viscerotonia, somatonia, and cerebrotonia based upon the functional preponderance of viscera, soma and conscious attention respectively. A viscerotonic seems to be glued firmly to the earth depending upon his superior powers of alimentation and social agglutination for his very survival. A somatonic, wandering some distance, developed powerful equipment of both offence and defence conquering his way through vigorous muscular efforts and predation. The cerebrotonic drifted off still further and achieved a more sensitive exposure and further refinement of receptors while sacrificing visceral mass and somatic strength.

Realization of the individual self and the universal self-have been the very important goals for which many men of different religions and cultures have striven during their life time. Applying Sheldon's scale, of evaluation of the personality traits to highly advanced seekers of the Reality who have been acclaimed as having had the realization of the Ultimate Reality, it has been found that a rating of 4:4:4 of viscerotonia, somatonia, and cerebrotonia can be obtained. The omniscient, omnipresent and omniloving being gets a rating of 7:7:7 which is impossible for any individual in human frame to attain. These ratings indicate that a temperamental equilibrium or moderation has been achieved by these personalities.

The physiological processes of the body tend to experience a homeostatic drive such that an ideal state is established in the body. Similarly, the psychic process influencing the very personality of the individual also experience a moderation drive resulting in the attainment of equilibrium of the personality. Equanimity under conditions of pain and pleasure and toleration for the opposing traits (Dwandvas) results in the attainment of the cherished goal of Samattva through the continued practice of yoga. Thus, the very transformation of the personality from mundane-human levels to the spiritual super human and finally to divine levels is the result of the utilization of the cosmic energy. The physiological homeostatic drives leading to the psychic moderation of the temperamental traits result finally in the spiritual state of samattva where the influence of the environment and the upbringing and knowledge is

brought to a minimum, if not totally negated, and the psychological make-up of this individual is just the same as that which was conferred upon him by Nature. Though such a highly advanced individual lives in the society for all practical purposes, and does not show any signs of being different from other individuals, he is all the time non-attached to anything in this world. On the other hand, he dwells in the higher planes of existence for all the time and lives in the world for discharging his duties to his fellowmen and to other higher beings.

Every religion has insisted that the laws pertaining to the code of personal and social conduct, ethics and morals be strictly adhered to by the followers. Without strict compliance of this set of rules, it is clearly indicated that it is not at all possible to be religious, not to speak anything of treading on the path of Reality. Despite innumerable variations, a set of rules can be identified as common to most, if not all, of the religions. Shri Ram Chandra has laid down a set of rules to be followed by his disciples and these are known as the Ten Commandments. In His "Commentary on Ten Commandments of Sahaj Marg" he has explained at length about their significance and the need for following these commandments in order to mould the very personality of the seeker to suit the pursuit of the path of Reality.

Neuropsychology provides a model of its own for an effective ethic for man. Man, is a gregarious and social organism, exhibiting certain behaviouristic patterns the control of which is based to a greater extent on social determinants while the behaviour itself has Memory motivational drives as its very main spring of origin. Since societies necessarily have different cultural social, economic and political hues and shades, an intermeshing of extraneous social determinants and innate' drive mechanisms results which, in its turn, effects "the homeostatic mechanisms of-man. Thus, the biological, socio-economic, and politico-cultural organizations, through the perpetuation of neurological processes in individual men result in the formation of best men of the top echelon of the society who possess extraordinary traits and qualities in contradistinction to the baser animal traits of man. These qualities are regarded as supreme and sovereign in man. It is an accepted truism that personal morality and socio-politico-economico-cultural institutions cannot exist separately. In general, the more the former the better is the

latter. Thus, personal morals, ethics, or codes of conduct for individual men play a role in the evolution not only of individual men but also of societies and finally of nations at large.

A critical outlook at the commandment Numbers 4 to 10 (Commandment No. 4: Be plain and simple to be identical with Nature; 5. Be truthful. Take miseries as Divine Blessings for your own good and be thankful; 6. Know all people as thy brethren and treat them as such; 7. Be not revengeful for the Wrongs done by others. Take them with gratitude-as heavenly gifts; 8. Be happy to eat in constant Divine thought whatever you get, with due regard to honest and pious earnings; 9. Mould your living so as to rouse a feeling of love piety in others 10 At bed time, feeling the presence of God, repent for the wrongs committed. Beg forgiveness in a suppliant mood, resolving not to allow the repetition of the same) of Sahaj Marg, especially the commandments numbers 5, 7 & 10, would enable one to realize that they are mainly intended towards the controlling of the emotional behaviour and to channel the imaginative thought faculties of the seekers towards reaching perfection and purity in the context of his spiritual pursuit. After a thorough and successful practice of meditation and the commandments, the seeker reaches a state when his emotions are neither in, nor of, nor for him. He refuses to allow his emotions to develop into passions and hence he is in a position to take an objective view of all events of his life in this subjective world.

Thought, as we know, plays a not insignificant role in the control of emotions, character and the very personality at large. Within the mind of every individual there are tremendous forces: forces that can, heal and bring happiness and peace or disrupt and destroy the very person. Every man has Divine and Demoniac (Asuric) forces in him. It is only the training and proper moulding and regulation of the former that paves the way for the onward march on the road of Reality. It is the proper equilibrium between these two opposing forces that is regarded as moderation.

Yogis of yore have clearly identified imagination as the generating force behind emotion. Imagination plays a very unique role in the life of an individual. If it is properly controlled, the emotions automatically get checked and thus one finds oneself beyond the influence of desires. The

desireless thought, speech and action as propounded by the earlier seers of India are regarded as thought in its purest form and at this level the thought itself becomes a mighty and subtle forceless force or the Real stuff, and enables one to go beyond thought itself and enter an almost thoughtless stage and get in touch with the reality.

Despite the scientific observations and accurate analysis of the emotions by the yogis of the Orient, it is only in recent times that modern science has come up to appreciate the role of emotional imbalance in the very wellbeing and survival of man. Investigations of men like Freud, Jung, Adler, Havelock Ellis, James, Selye and others have contributed realization of the fact that the emotional imbalance is the result of a combination of complex factors, and that quite often it is an automatic or reflex action produced within the organism to cope up with a really existing fancied and hence non-existent emergency in the life of an individual. Emotion is one of the defence mechanisms evolved during the millions of years of man's perpetuation. James defined emotions as the feeling of bodily changes as they occur. Emotions differ in quality and in other characteristics like direction, content etc. The Attitude theory (Arnold, 1960) holds that the various emotions are inseparably connected with corresponding sets of postures. Particular body posture or tendencies may determine the appearance of specific emotions. Thus, the quality and direction i.e. pleasant unpleasant of the emotional-motivational process is closely connected with specific patterns of movement and/or body attitude. Recent neurosurgical investigations have confirmed the existence of separate independent neural substrates for the elaboration of subjective emotional sensations like pleasure (actively sought) and pain (actively avoided). Stresses or tensions have been considered by Selye (1950) under physiological and psychological categories to which most of the people are subjected during the course of their struggle for existence in this competitive society. Benfari and his colleagues (1974) have identified as many as 6 categories of psychological disorders which were found to correlate with various diseases. The dimensions of psychological disorders identified by them are (1) physical anxiety (e.g. shortness of breath, trembling), (2) topically oriented trembling (worries about outside realities), (3) disturbance of physiological process (Insomnia, loss of appetite), (4) noncognitive depression, and (5) alienation or withdrawal.

One is acquainted with the subjective aspect of the emotions which is highly variable from individual to individual and which can often be strong and ever-lasting or at times sudden and evanescent -like throbs, thrills and shocks etc. There need not be any conscious prompting for the appearance of emotions. Despite the fact that some attempts have been made in early Greek literature to separate emotions from intellect we find that these two can interact and influence each other considerably. It is often our intellect that is responsible for the setting up of emotional states, and the price paid for being an intellectual seems to be very high. Strong emotions are pleasures of life despite the fact that some of those concerned with vices are disagreeable emotions.

The neurophysiological investigations on the rage and pleasure mechanisms have revealed the role of certain centres in the human brain. Occupying the base of the brain and around its medial aspect are found a number of brain structures comprising inter-connecting groups of Nuclei (Concentration of nerve cells) and nerve fibre tracts which are, regarded as Limbic brain (Broca, 1878) or Limbic system or Visceral brain. These structures have been shown to constitute system of numerous interconnections existing between parts of the Limbic brain structures, the Hypothalamus and Reticular formation of the brain stem of man. This system is responsible for the elaboration of the subjective experience of emotion. It is, therefore, of interest that lesions or stimulation of these regions produce changes i.e., inhibit or release emotional behaviour relating to the activities of each of the centres such as learning; feeding involving sniffing, licking, salivating, chewing, swallowing; sexual activity including hypersexuality and defective maternal behaviour; alarm; rage; aggression, social behaviour and pleasure.

The Information accumulated so far on the architectonics, neural structure and connections of the C.N.S. enables one to make certain generalizations regarding the structural organization of the several reflex mechanisms of varying functional significance. Automatic and automatized reflex mechanisms of high intricacy participate in the maintenance of the psychophysiological states of the organism. Organised chains of neuronal switches built in the human brain are related to the most complexly integrated phenomena of reflex activity. This forms the very basis of the behaviour and personality of the individual both

congenital and acquired during the life of an organism. Phylogenetic selection controls the genetic mechanism which in its turn influences the simple mechanisms for preservation of life. Important individual behaviour patterns and personality traits are determined and the basis laid down even before birth (prenatal). However, complex reactions to the environmental stimuli forming reflex mechanisms have got to be learned after birth and reinforced through repeated experience and learning. Thus, psychic functions through repeated actions become completely or incompletely automated. This may reflect on the behaviour side as habits of a person. Mechanisms of extreme complexity are mastered resulting in the success of the motives or innate drives with great speed and high accuracy.

That the mental phenomena of memory, volition, imagination, reminiscences, perceptions, emotions, passions, feelings, desires, cognition, thought, reasoning, theories and the like, are considered to be facultative manifestations of a personal soul, forms the chief tenet of the orthodox Spiritualistic theory. Associationist schools view the very Self or Ego of the individual as no longer a preexisting source of these faculties but on the other hand it is the final and most complicated outcome of these mental faculties. Recently, it has been expressed that both Spiritualists and Associationists must be Cerebralists since the laws governing the brain function explain the peculiarities of both these theories. Befitting its structural and physiological dimensions of highest complexity and order, the human brain synthesizes from its very depths of the substrate correlates for what exactly goes on during the processes of thinking, deciding, feeling, anticipating, believing et., by man. Thus, brain forms the very field of interplay for these processes and hence it is not possible to say that brain thinks or takes decisions. On the other hand, it is the individual who does all the acts of thinking, deciding, feeling etc. Even a thorough physiological understanding is not sufficient to dispel the mystery associated with the human situation of dualism. An irreducible dualism of human nature which can never be exhausted by mechanistic analysis has got to be recognized and accepted in the final analysis. That the brain and mind are complementary, and that different levels of organisation of human condition represent dualism of aspects rather than of stuff is the crux of present-day thinking. Mind-Brain problem, a challenging and elusive problem of philosophy since times immemorial,

has engaged the psycho-physiologists of the recent times though somewhat in a changed form i.e., as Mind-Behaviour. As a result the physiological and subjective processes of the brain and behaviour of the higher animals and in particular man have been objectively analysed in recent times.

Quest for knowledge about the environment has always been the concern of men of different levels and calibers of different times. These attempt at comprehending both the worlds i.e., the world outside and the world inside - constitute the very essential and highly valuable steps in the evolution of man owing to the survival and adaptive values. The natural law that the organism which has knowledge of its environs has greater and much better chances of survival in this competitive world is quite obvious. Monotonous repetition of untold miseries and sufferings form the significant and universal theme of Life's Drama. Conquest of misery has been the main problem of man ever since his inception. The approaches have been made at the sensory level, at the level of reason and finally at the level of intuition by the seekers of the knowledge of the environment or the Truth behind existence giving rise to such branches of enquiry like biological, physical, psychological, social, political sciences and Philosophy, which were in vogue since time immemorial. The result is several patterns of vision of the Reality forming the basis of the multiple schools of thought of the Occident as well as the Orient. Several systems of Philosophy sprang out of the Vedic culture and these Darsanas i.e., systems of Philosophy giving a vision of the Reality leading to Liberation include Nyaya, Vaisheshika, Samkhya, two Mimamsas and Yoga. Under yoga once again several systems like Bhakti Yoga, Karma yoga, Gyna yoga, Tantra yoga, Mantra yoga, Raja yoga have been identified bringing in several basically different systems under one category. History has witnessed the rise and fall of several other schools of Philosophy like, Dvaita, Advaita and Visistadvaita of the Hindu religion, in addition to Buddhism, Jainism and other innumerable schools of thought, and the religions of the West. The insight, the intuition and the revelation of the vision of these multifold systems seem to have been lost or fallen into disuse during the course of the ages. Sahaj Marg system, considered as a new Darsana and suited to the needs of the present times, promises not only the cosmic evolution of man through all its levels but also to grant

that vision of the Reality which the earlier Vedic Rishis or seers possessed.

Men of religion and philosophers have predicted and even heralded the ushering in of an entirely new race of human beings the superman. Speculative descriptions of the physical and mental capacities of the, Super-Man have been advanced. Evolution on cultural lines with, mental faculties and dimensions acquired newly, in addition to the already existing ones, may be the very basis of the further or cosmic evolution of the human race. Drastic adaptive changes in the genetic set up of man are not considered possible. The trend of the further biological evolution of mankind has been regarded as being in the direction of the evolution of cosmic parameters of the mind but not of matter. Shri Ram Chandra predicts that an entirely new civilization, having spirituality as its very basis and anchor, will spring out of the ashes of the present materialistic civilization by the turn of this century which happens to be the last of this millennium.

Many people of consequence from the East and the West have spoken, in glorified terms, about the 'Life after death' or 'Life after life' indicating possibility of cosmic evolution. The experiences of clinically dead people, as revealed by them after revival into life, indicates the existence of a different type of life after the death of the corporeal body of man. Immediately after death these clinically dead people experienced a peculiar phenomenon of instantaneous and extremely rapid and very vivid recollection of all the events of their lives. This experience has been described to be altogether different from the normal type of recollection. Certain traits of the psychic being have also been described.

It would be worthwhile, at this juncture, to examine the concept of a human dwelling as an analog. In essence a dwelling place represents a crude and a natural place, as it used to be in the earlier days of human civilization at the level of cave man-a cave; at the nomadic stage - a crude tent made up of animal hide ; at the pastoral stage crude hut ; at the agricultural stage -a house built up of wood; at the level of industrial society - a modern brick and mortar house ; at the level of technological stage - an ultra-modern concrete building with all the creature comforts

and extra amenities bordering luxuries in the form of a T.V., Air-conditioning, Telephone, Lifts and ever so many mechanical gadgets. Though not a part of the concept of a dwelling place in the initial stage, the principle of electricity and its domestic use has been very much taken for granted and without it the image of a modern house suffers very much.

In a similar way one can survey the theory of organic evolution and find that at some later and more recent stage in the evolution of organic life the principle of consciousness has been incorporated in the animal body thus changing the very course and outcome of the evolutionary process drastically, resulting in the formation of the final product of organic evolution, the Homo sapiens. This new principle of consciousness in the frame of a physical body forms the very basis of cosmic evolution which in itself is a continuity of the organic evolution. Only when the cosmic evolution takes place, of course in individual men, then only the very purpose and meaning of life, in all its multiplicity, could be understood. Otherwise, one may have to be content with the idea that man is a bag of fertilizer.

RAJA YOGA

The manifestations of nature as perceived by our senses are gross and these are the effects of still another variety i.e., the subtle ones which are beyond our senses. Since the dawn of history such subtle phenomena have been investigated and formulated in the form of Raja Yoga and the practice of this Psychic learning (Adhyatmik Vidya) or greater science (Bruhadvidya) will lead to the acquisition of subtle perceptions that are usually beyond the comprehension of our senses and mind. Raja Yoga is known so because it is regarded as Raja or king or sovereign among all other innumerable yogas that have come into existence since the dawn of civilization. An immense and inexhaustible ground is covered by the term yoga which means “to link up or connect with the Ultimate “.

Liberation of the soul from bondages of matter and the final realization of the Truth beyond matter and spirit has been the only goal of the several orthodox systems of Philosophy.

Every branch of enquiry has its own methodology, and we are well acquainted with that of science i.e., the method of enquiry regarding matter whether it concerns the biological, physical, chemical, mathematical, astronomical, engineering, etc., etc., aspects of Nature. So also yoga has its own methodology. And we are told that it is unique. The methods of practice have been codified and laid down in the form of yoga aphorisms based upon the Sankhya system of Philosophy by the ancient seer Patanjali some 4000 years ago and hence this system is also known as Patanjali Yoga. It is recommended that this method can be learnt effectively and safely by direct contact with a teacher. Yogis or teachers of yoga of the past claimed that these experiences can be personally verified by the aspiring individuals. For acquiring and observing these internal subtle states, the mind itself is the only means of knowledge according to Raja Yoga. To turn the mind inside, or Inversion from its normal state of wandering outside or Extroversion, and to put all its concentrated powers on itself with the sole intention of knowing itself and analysing its nature and functions are indeed difficult. Yet this is the only way of studying and knowing an internal object i.e., mind, by one's own mind itself. There is no limit to the powers of the human mind. The more collected and subtle it is, the more is the abundance of its power. Thus, Raja Yoga proposes not only to teach us but also to bring into our own experience the existence of a soul, the concepts of Eternity and Divinity. During the practice of this Yoga no faith or belief in the existence of a soul, individual or Universal, is necessary. A part of this training is physical but in the main it is mental and mostly deals with the mental faculties. The role of the mind in the functioning of the body is highly important. The control of the body by way of the control of mind is also achieved.

Sankhya philosophy, upon which Raja yoga leans heavily, holds that the impressions of the objects of the external world or gross world are carried to their respective areas in the brain through the outer instruments (sense organs), and that they in their turn convey the information to the determinative faculty through the mediation of mind, and that, finally, the soul receives these impressions in a subtle way from the determinative faculty and acts by giving orders to the motor centres for the execution of

the required work. With the exception of the Soul or Purusha all the others are material in nature though the mind is a somewhat subtler and finer manifestation of matter. Mind is an instrument of the Soul for the interpretation of the nature of external gross objects.

Raja yoga is also known as Ashtanga yoga since it consists of eight steps. They are: Yama, Niyama, Asana, Pranayama, Pratyahara, Dharana, Dhayana and Samadhi. Yama concerns itself with the moral code of the person and includes the development of the traits of Ahimsa, (non injury), Satya (Truthfulness), Asteya (non-covetousness) Brahmacharya (chastity) Aparigraha (non receiving). Acquisition of regular habits and observances like Tapas (Penance), Austerity, Svadhyaya (study); Santosha (contentment) Saucha (purity) Ishvara-pranidhana (God worship) form the second step called Niyama. These two steps result in restraining the senses from running after objects. The mental control thus obtained forms the basis for moral distinctions between truth and untruth, injury and non-injury, cheating and honesty, robbery and charity, continence and incontinence, purity and impurity, Godliness and ungodliness and so on. Without morality no spiritual growth is possible.

While the first two steps, Yama and Niyama, aim at the control of mental activities bringing in a change in the over all behaviour of the seeker, the next two steps. Asana and Pranayama, aim at the perfection and control of the physical body. It is believed that without a perfect physical body no perfection of mental processes can be attained. The physical discipline of the body is carried through the practice of Asana (posture) and Pranayama (control of prana or breath). Under Asana one has to attain and perfect the sitting posture in the easiest way keeping the chest, neck and head upright. The breath control is obtained by the practice of regulated inhalation (Puraka), retention (Kumbhaka) and exhalation (Rechaka). Regular practice at least twice a day during morning and evening will enable one to perceive the subtle forces, the 'nerve currents that flow along the body, and get control over them. Finally, the control over these subtle forces will enable one to know how to reach the perfect state of control over the mind and body simultaneously. Other schools of yoga like Hatha yoga have expanded these sitting postures and included several types of Asanas, which have therapeutic value. They can lead to the perfection of the physical body

which is free from ailment. Similarly, breath control of different varieties advocated by other schools of yoga confer longevity, physical strength, vigour, and agility of the body.

The next step In Raja Yoga Is Pratyahara restraint of the senses from their objects. This is attained by constantly practising control over the mind leading to dissociation or withdrawal of mind from the regulating centres of the sensations. At this stage one becomes free from the bondage of senses but constant practice and vigil are absolutely needed for a long period. Then follows Dharana or fixing the mind on a single aspect object. Heart, the tip of the nose, or the crown of the head is taken as a reference point for contemplation or to focus one's attention.

All the foregoing six steps are only means for the attainment of the last two steps i.e., Dhyana (meditation) and Samadhi (super-conscious state). When the mind is trained to remain fixed at a certain location, the power of a continuous current flowing into it at that point is attained by it, during Dhyana. When one has intensified the power of Dhyana as to remain in the subtler part of the perception and its meaning, one attains the state of Samadhi. Dharana, Dhyana and Samadhi together constitute the single process of Samyama. The mind concentrates on a point or object and is able to be in that state for lengths of time, dwelling in the subtler or causal aspect of the perception. This state is the highest state of human existence.

Hatha Yoga:

This is one of the several types of yoga practised since ancient times, and it aims at obtaining perfect mastery and control of the physical body. Since its concern in the main is the physical body, in relation to mind, it has been regarded. As physiological yoga or Ghatasya yoga. Wholeness of man is its basis, and it strives to achieve psychosomatic sublimation through a system of training which includes physical education, hygiene, therapy and the control of the autonomous nervous system influencing the hygiene of the mind and moral behaviour. The nerves and the brain, the muscles, all the tissues and different organs are

toned up and energised. One will have unlimited energy for work, muscular strength and nerve power, a charming personality, and finally live for long years. The practice of Hatha yoga will remove all deep rooted and chronic diseases. The tendencies towards ill health are counteracted by rejuvenating the body. Premature ageing is prevented and a sort of eternal youth is bestowed which will definitely postpone death. Several postural exercises (Asanas) are recommended for men and women along with the daily practice of personal hygiene and care of various parts of the body and vital organs. Regulation of Bioenergy (Prana) by way of practice of controlled breathing (Pranayama) and specific methods of sex sublimation and control of the nervous system lead to the discipline of the mind.

After gaining mastery over the physical postural exercises and the breathing exercises, a serious student of Hatha yoga steps into the Kundalini yoga or the acquisition of vital power that gives supranormal powers or Siddhis to a yogi. These powers are regarded by the propounders of Raja Yoga as (1) mere obstacles and diversion on the onward march of the seeker and (2) their utilization in the material plane of existence leads to the degeneration and down fall of the seeker of Reality. In most cases premature utilization of these Siddhis leads to the worst kind of abuses of yogic power leading to greatest evils to mankind.

The source of all vital powers is Kundalini shakti, the subtle force in man. It is located in the lower part of the body near the level of navel and corresponds with the anatomical Pelvic Plexus. It is believed to be in the form of a coiled serpent and hence it is also known as serpent power. Its power is immense and cosmic in nature, and hence it became the object of pursuit of yogis or Hatha yogis. In every individual this power lies dormant and it automatically awakens after reaching a final stage of maturity and higher levels of attainment of a Raja yogi. Through physical practices of Asana, Prana-yama, etc., it can be forced to awaken making it active. When active this power stretches through the canal in the centre of the spinal cord all along its length, connecting the Sahasra-Dal-Kamal located at the crown of the head with the Muladhara Chakra of its tail end, located at the base of the vertebral column. The effect of the awakening of kundalini while travelling upwards along the spinal canal automatically

brings about an awakening in the chakras which the spinal cord innervates. The details of these chakras are given on the next page.

In addition to the 6 chakras and kundalini, other nerves also come into the forefront, especially the Nadis called Ida, Pingala and Sushumna, which play a very crucial role in the making up of a Hatha yogi. Ida, located on the left side of the vertebral column, ends in

S. No	Name of the Chakra	Neurophysiological concomitant	Location
1	Muladhara	Basic plexus	Near the side of the Rectum.
2	Swadhistana	Hypogastric plexus	Pelvic region at the level of the Root of the penis.
3	Manipuraka	Solar plexus	Region of umbilicus
4	Anahata	Cardiac plexus	Heart region
5	Visuddhi	Pharyngeal plexus	Throat region
6	Ajna	Cavernous plexus	Between the eyebrows at the Root of the Nose.

the right nostril while Pingala located on the right side of vertebral column ends in the left nostril. Constant practice on the working of these Autonomic nerves gives tremendous control over the metabolism of the body. Sushumna is centrally situated and passes through the spinal cord originating inside the Kunda or the sacrum at the level of umbilicus and runs up into the head to join Sahasra-Dal-Kamal. At the region of the throat Sushumna gives off branches. The anterior one goes towards the frontal lobe of the brain while the posterior portion goes towards the cavity of the brain. Sushumna is connected during its ascent with all the 6 chakras by way of nerves that anastomose, and forms the chakras at different parts of the body. Particular group of autonomic nerves and its sub-conscious activities are under the control of the chakras. These chakras are to be purified by removing all the grossness that has accumulated, before they can be activated and brought back to their

original state of glow and activity releasing their dormant powers which are very subtle and vital forces.

SAHAJ MARG

When we look around, we find things animate and inanimate. It is the animate that concerns us most and especially the animals which move about. Animation has movement' as a characteristic feature. The animals move about carrying on ever so many acts. That can be classified as concerning (1) procurement, intake, digestion and assimilation of food, (2) possession and utilization of shelter, and finally (3) procurement of mates and discharge of reproductive functions. While discharging all these functions the animals move about from place to place horizontally. This wide category of animals includes another species of a special type - a rational animal i.e., Man. Man is what he is because of a supreme thing in him. While he possesses the cardinal features of food, shelter and reproduction of the animals, he is in addition endowed with the capacity to think and be aware of it. It is this capacity to think and rationalise that makes him a rational animal. Thought alone is the supreme kingly or sovereign thing in man. He also moves about horizontally, but his verticality indicates that another direction of movement is also given to him a movement in the vertical direction. This does not make him capable of shooting himself into the skies, but he can shoot his thought into the skies, Universe (Brahmanda) or Cosmos (Parabrahmanda) or still higher regions or, alternately, into the very depths of his heart, mind or being all the while sitting in an armchair. This capacity to link up his thoughts with the universe on the one hand and his heart on the other is described by many people of Occult Science as yoga (to join).

Thought becomes a double-edged weapon which can be used by man for good or bad. It gives him the ability for construction and destruction, and is sometimes described wrongly as bondage. But it is the means for both liberation and bondage.

We do not know for certain when the first man came into existence. Since then, man has been thinking, thinking and thinking. One may ask about what? This is where the trouble arises. For example, if we take the case of a gathering of businessmen, lawyers, doctors, teachers, philosophers, priests and saints, and ask what are their thoughts, there is no way of describing them all.

Since the beginning of civilization man has given considerable thought to define life and living. Surely there is no life without living, and it is not possible to live without life. These two are so very intricately connected that one without the other is impossible just as the flame cannot exist without burning. Each man has given his own version of living and propounded a way of living. If the different categories of people of a gathering are asked individually to give a definition of life and living, we cannot even visualise the variety of answers or response. In this context it is worthwhile to recall the popular story of the elephant and the blind men who wanted to know what an elephant is. Each one had given his own version of the elephant and not finding any confirmation in the other man's version of the elephant with his view point, explicitly based on experience, they started quarrelling among themselves. The mahaut, who was enjoying the fun all the while, told the blind men that each one of them was correct and also wrong. To the extent that each One of them felt and experienced a part of the elephant they were correct, and to the extent that they missed the experience of the totality of the elephant, they were wrong. The elephant is sum total of all their experiences. Now translating this story into the context of life and living, we find that it is not possible to come to an agreement unless we develop an integrated approach.

The experience of saints and sages of the orient as well as the occident of the earlier times has revealed the existence of several types of men. To put it simply, it is possible to classify men into : high, higher, highest, middle, low, lower, and lowest types. Well this is what they said. So, by experience it is found that these categories of men have different quantities and qualities of thought and it is not possible for all of them to have the same type of thoughts. The men of highest calibre and keenest intellect held that the low, lower and lowest categories of men have so much of animal instinct in them that their reason fails to function effectively, and hence they are far from thoughts concerning abstractions

and yoga owing to their intellectual and rational insufficiency. The rest of the categories pondered over- and tried to define life and evolved a method of living. The outcome, as we all know, is the initiation, establishment and ultimate fading out of several religions and spiritual systems all over the globe. The present systems fail to give to man a correct and, more important, a peaceful way of living. The very fact that innumerable systems have appeared and held sway for some time, only to disappear partially or totally, would itself be the proof that no single system by itself is a solution for all times to come though they may be useful for certain periods. Prophets, saints, sages and Avatars have come and gone but it is heart-rending to find that the humanity is no better. Man remains just the same. Considering our present times, we find ourselves pushed into a corner. We are not able to follow the foot-steps of our forefathers, nor do we have knowledge of a new. Way of living without crisis of personality.

Man is proud of his advancements in the economic, social, educational and, more particularly, in the industrial fields of his life. At present, technology has reached a new peak, Its impact on life is tremendous affecting many aspects of life. All barriers of caste, creed, community, race and finally religion seem to be disappearing, and Indian and other democratic countries of the world have recognized the equality of all men. It looks as if men are put on a gigantic carpet and rolled into one. Earlier, it was Monarchy or Plutarchy if not Anarchy. It may even be dictatorial but now the rule of democracy is operating. It appears as if a new experiment in the progress of the human race is being carried out. Our technological development has enabled us to contract space and time. For example, in the earlier centuries any pilgrim from South India to Varanasi, or any other place of pilgrimage in the Himalayas, did not return home within twelve years. His relatives used to consider him as dead and perform obsequies (Sraddha) for him. But now it takes a few hours to reach these places by air. Under these conditions surely there must be a way of life or a way of living which is not far from life or Nature. A simple natural way of living must be there which, while giving us, yoga enabling us to have cosmic evolution, can help us to live a harmonious, coherent and more purposeful life in contemporaneous society. Is there one? Has it been found out?

Yes! Says Shri Ram Chandraji who advocates the Sahaj Marg way of living. Anybody who wants to know Him does not take much time to realise that he is an adept at Brahma Vidya. He is an acknowledged saint of the highest calibre. He ask no questions and collects no entrance fees, but only insists that one should have aspiration for the higher life and be willing to follow this simple, natural and surest way of living, which is Sahaj Marg. Shri Ram Chandra Mission, named after Samarth guru Shri Ram Chandraji of Fatehgarh, U.P., India, was founded in 1945 by his successor and representative Shri Ram Chandraji of Shahjahanpur, U.P., India.

The Mission advocates the system of Sahaj Marg (Natural path of realization) for the spiritual uplift, cosmic evolution and regeneration of humanity in general and the householders (Grihastha's) in particular. In essence it is an adaptation of the age-old and well-known system of Raja yoga, suiting the needs and requirements of the present technological society. The uniqueness of the system lies in its simplicity and its process or the technique of yogic transmission of cosmic energy or Pranahuti- a technique long forgotten. Transmission of cosmic energy into the heart of a seeker (Sadhak) is the focal point of the training in this system. This transmission possesses the energy, though in a subtle form, of the Divine or. The very First Thought that has resulted in the creation.

For reasons best known to ITSELF and to MASTER (Shri Ram Chandra believes himself only to be a guide and not a Guru) and drawn by the aspiration of the seeker, when it descends upon the seeker the cosmic energy naturally lifts the thoughts of the seeker. The higher movement of the thought is due to the effect of transmission of Divine energy that is put into the heart of the seeker. It is similar to magnetic attraction. It is not the iron filing that moves toward the magnet, but it is the magnet that pulls the filings. That is the reason why Shri Ram Chandraji has limited the age-old eight steps of Ashtanga yoga (Raja yoga) to the final three steps of Dharana, Dhyana and Samadhi in the Sahaj Marg system of practice. The other steps naturally follow in the wake of transmission of Divine energy. When the energy is pouring on one, one cannot confine one's attention to the training of yama, niyama, asana, etc. They are all included in the very process of Divinisation or transformation of man to Supra-human and Divine levels by the introduction of Divine energy through the technique of Pranahuti. Thus,

transmission leads the rational animal to human, Supra-human and finally to Divine levels of existence, while he is attending to his household and other duties without any conflict of personality.

The aim of Sahaj Marg is the spiritual upliftment and cosmic evolution of the seeker aspiring individuals without any distinction of religion, race, nationality, caste or creed. The only qualification needed for entry into the system is a craving for the realization of the Ultimate (Truth). The goal of the seeker should be nothing short of the highest of all, i.e., the realization. Shri Ram Chandraji, either directly or through the mediation of his preceptors working in several places of the major countries of the world, transmits the cosmic (Divine) energy through the process of Pranahuti and cleans the psychic system of the seeker while connecting him to the ultimate source of energy. When constantly practised with faith surrender and love, this leads the seeker on and on towards the realization of the Absolute.

This system is very simple for the modern man to follow since there are no rituals or elaborate procedures to be followed. In fact, this system caters particularly to the needs of grihastha's. The socio-economic obligations have got to be attended to by the individuals while pursuing this spiritual path. Both materialism and spiritualism are to be given due and equal importance and consideration without any predominance of the one at the cost of the other. They are to be regarded as the two wings necessary for the upward flight. All that is needed to be done by the seeker is to meditate on his own heart at regular timings (Commandment No. 1: Rise before Dawn. Offer your prayer and puja at a fixed hour preferably before sunrise, sitting in one and the same pose. Have a separate place and seat for worship. Purity of mind and body should be specially adhered to.) at his dwelling place. (Commandment No. 2: Begin your puja with a prayer for the spiritual elevation with a heart full of love and devotion.) The divine impulse imparted through Pranahuti affects the mind of the abhyasi and helps to bring it to a higher level of consciousness which slowly and gradually enters the realm of super-consciousness. This yogic process relates to the subtle powers dormant in the spirit of man rather than the matter in him, and results in the initial fortification and strengthening of the will and intelligence of the seeker along with the acquisition of peace and lightness of the body at the very inception itself.

Realization of the Ultimate truth being the pursuit of the subtle being of our existence, any amount of metaphysical, intellectual or rational endeavours that are so very characteristic of material mind would be of no avail. On the other hand, they may even defeat the very purpose of the seeker.

The tendencies (vrittis) of mind begin gradually and increasingly to turn towards the higher and the unknown realm of super-consciousness and the seeker begins to feel calm and peace. This is the very first step of advancement in the spiritual training under Sahaj Marg. The impulse transmitted into the heart of the seeker begins to act slowly and, in course of time, on the deeper layers of his consciousness related to the finer and subtle forms of his existence of Astral and still more finer and subtlest and root cause of his existence, the causal body. When these subtle bodies are cleansed sufficiently from all the accumulated impressions of the past the effect begins to expand and, after some time, descends to the Astral mind and thence to the conscious mind. Consequently, the conscious mind gets moulded in the subtler forms of existence and begins to realise some subtle changes in its inner tendencies. Of course, all these changes concerning biological processes need the passage of time and hence the seeker is unable to feel the effect of the transmission for quite some time in the initial stages. The effect produced is deep-rooted and everlasting. In Sahaj Marg, the moulding of the mind takes place in a most natural way without any strain or physical labour on the part of the abhyasi. The seeker shifts his attention from the temporary and the Mundane to the everlasting, the spiritual pursuits having started automatically the practice of Vairagya (Renunciation) during the process. This is not in any way the age-old physical renunciation of the worldly life but it is only the absence of the feeling of attachment. When undue attachment to the materialistic tendencies of the mind are gone, one very naturally finds his place in the society, or the world as one of duty'. Even this, though not an easy state to attain, is only an elementary attainment under this system of training. Vairagya or Desirelessness thus attained leads to the formation of lesser and lesser impressions in the mind till even these few impressions stop forming, resulting in an almost thoughtless state and this leads one out from the endless cycle of births and deaths.

True it is that the system does not prescribe any formal physical or Mental exercises, but the seeker at the very outset is required to set his goal on nothing short of the very highest itself i.e., complete oneness with the Infinite, for his spiritual pursuit, since nothing can be achieved without any clearly delineated goal. The question of any single one of the infinite manifestations of Absolute, coming into the view of the seeker as a goal, is to be rejected totally (Commandment No. 3: Fix your goal which should be complete oneness with God. Rest not till the ideal is achieved). The seeker has to develop, though even artificially at the beginning, real craving for the realization of the Ultimate and this naturally pushes him on to the state of a burning desire and restlessness without which any accomplishment on the path of spirituality is quite impossible. The pangs of deep craving, restlessness and the burning desire for the realization' is the only path for the seeker of the reality.

The role of the teacher in the spiritual training for the realization of the Absolute is the most important factor in Sahaj Marg since the entire responsibility of success lies on him when the seeker practises meditation under his guidance with all faith, love and surrender. The meditation has to proceed in a subtle form without bringing in the grosser effects of shape, form and name of the object, etc., since the final state to be attained is extremely subtle.

MEDITATION

A glance at the history of the rise and fall of the civilizations of the earlier era would reveal that either materialistic and extrovert behaviour or spiritualistic or introvert behaviour dominated exclusively or in different proportions, the human behaviour. The materialistic, individualized, self-conscious and ego-centric civilization of the present century is witnessing, at this juncture, a counter-tendency in the culture by making attempts to turn more towards spirituality and introspection. In addition to the age-old techniques of prayer, fasting and meditation new techniques of psychotherapy and a whole series of psychedelic drugs, thanks to the advancement of Pharmacology, have been opening up new vistas and hitherto unknown horizons of human mind and experiences. This upsurge has brought in its wake innumerable methods of practices to get at the spirit', though some of them are highly lamentable in view of the fact that they defeat the very purpose of the search and introspection.

The practice of meditation as a means to achieve the ultimate goal of attaining union with the Divine, while deriving happiness and peace in everyday life, has been in vogue since the very early days of human civilizations. Almost all the religions have prescribed it in one form or other to be assiduously practised by their adherents. The teachings of the major religions of the world abound in references to this age-old technique. Detailed instructions, though highly variable from one system to another, of how to practise meditation, how it works on the human mind and body, and what effects are produced in the personality of the individual practising it are all given at length. However, the present scientific age has very little to extoll its virtues and our empirical science has practically no knowledge of it. Owing to its intimate connections with religion it has remained, even today, outside the realm of science. It is quite inadequately defined as simple serious thought' (Webster, 1956). Instances are not lacking where this term has been used to refer, rather

in a lighter vein, to the day-dreaming or brooding behaviour or introspective attitude of persons during day-to-day experience. Meditation may, in the context of its role in the evolution of a higher being, be regarded as one-pointed, receptive attention towards the attainment of superconscious state, and this is the only orthodox way of being receptive.

Time and again many criticisms have been levelled against meditation. The most serious objection is that it tends to produce mystics who are withdrawn from the world and the day-to-day happenings in their lives. A mystic need not necessarily be so in his behaviour. He is expected to take interest in material affairs as much as in spiritual pursuits. He is to keep both matter and spirit in equilibrium without neglecting either of them. One is to soar high into the ethereal and lofty heights of spirituality using matter and spirit as the two wings for his flight upwards. It has been an accepted notion that the growth of man lies in his realization of the individual self which is an integral part of the universal or Cosmic Self. Some of the generalized and important benefits that attributed to the regular practice of meditation are: (1) Expanding awareness, (2) Acquisition of calm and quiet attitude even under conditions of stress and strain, (3) Improvement of physical abilities and qualities leading to a better functioning of the body, (4) A contented and happy life resulting in a more harmonious living in the contemporaneous society and (5) Acquisition of more energy for constructive work. These are some of the benefits that accrue to the meditator on the material plane of his existence. Recent times have witnessed the introduction of new systems of meditation as in the experimental meditation of the west and the Contemplative and the Transcendental meditation of the east in addition to the revival of the age-old practices. Not enough of stress has been laid on the spiritual goals of meditation,

The procedure adopted for meditation by the followers of Sahaj Marg is detailed below. Sunrise and sunset are the important timings recommended for meditation, Shri Ram Chandrajji has explained at length in his "Commentary on Ten Commandments", about the significance of these timings. A place in the residence of the seeker, preferably a calm and quiet room, if one can be spared for this purpose, or a corner in the living room, is to be set apart for meditation. That (constantly used) place will, in course of time, automatically induce in the practitioner the right type

of mental make up for meditation. Of course, this is the common principle involved in setting up places for separate activities like eating or dining, cooking, reading and sleeping, etc. The place of meditation should be well ventilated and should be neither totally dark nor fully lighted. It is better if twilight condition prevails. The abhyasi has to sit on the floor using either an upper cloth or a mat a carpet as his seat. It is recommended that cushions and other elaborate be avoided. During meditation, the seeker should sit in a natural and comfortable posture which will permit him to sit in that posture for 30 minutes to one full hour without altering the posture. Those who are not in the habit of sitting on the floor are allowed to use a chair. Lotus posture (Padmasana) can also be used. Any sitting posture that can be comfortably retained with ease and without any strain for the duration of the meditation is just the needed One.

The seeker should meditate while keeping his eyes closed, at the time of sunrise and sunset for about one hour (but not less than 30 minutes) in the initial stages without forcing oneself unduly about the time limits. Constancy of timings and regularity in practice will help immensely. Before going to bed at night, he has to say the prayer and orient himself while contemplating the meaning and purport of the prayer. If he so desires, he can sit in meditation at other times of the day especially during night time. For serious sadhaks early hours of the day known as 'Brahmamuhurt' are very precious. One has to set his pace depending on the inner craving for the Reality.

At the beginning of meditation, the abhyasi has to recite the prayer which is a very simple and most efficacious one. It is not a secret one, It is not a Mantra. Mechanical repetition is to be avoided. After saying the prayer once (or a few times in the, early stages) he has to wear the idea or take up the supposition mentally that he is seated in the Ocean of Bliss and that its waves are passing through him removing all dirt and disease (Karmic dross and grossness) from his body. This goes on for a few minutes. Then the more positive thought of the Divine residing in his heart in the form of light has to be taken into the view for the actual meditation. Several systems have advocated heart, tip of the nose, centre of the eyebrows, crown of the head, back of the head, back of the navel, etc., as the focal points for meditation. In Sahaj Marg, heart alone is recommended for purposes of meditation, since it is the central machine

in the physiology of the body. Working as a pump house, it circulates several materials throughout the body. Furthermore, Sahaj Marg is unique in that it introduces or transmits the cosmic energy into the heart of the sadhak by a special technique called Pranahuti. This energy that is introduced into the heart is easily radiated to all parts of the body in no time. The physiological centre of the body has been taken as a reference point and used as a psychic centre for the advancement of the aspirant. While meditating on the heart the sadhak need not concentrate his efforts on the physical heart and its morphology and anatomy. On the other hand it is better he does not know all the details of the anatomy. It is sufficient if he can focus his attention at the place where the heart beat is felt. During the course of meditation, he is to think about the Divine Light that is present in the heart. He is not to strain. No special concentration is needed. The attitude should be one of relaxation. He should not try to visualize any kind of light. It is not the analysis of different qualities and different hues or different intensities of light or the different sources of light or the various thoughts associated with light, that is to be indulged in. It is only a thought that is to be focussed on to the heart and in actuality it is the concept as it were that is to be envisaged in its totality. Much better would it be if one can take it symbolically representing the cosmic Consciousness and step into the realm of the abstract. Since the experience of cosmic consciousness cannot be obtained in the beginning stage itself It is better symbolized by the Divine Light.

While this is being implemented it is usual for the seeker to feel a sudden onrush of thoughts sometimes the wildest of all, running riot but he is not to worry. It is not the suppression of thoughts by forced concentration that is needed in meditation under Sahaj Marg but a systematically practised weaning of thoughts and their elimination in a relaxed manner that will help in the progress. Whenever such onrush of thoughts takes place the attention of the seeker has immediately to shift to the concept of Divine light in heart and try to hold on to that thought for increasingly greater periods of time. Thus, this helps the unnecessary thoughts to be treated as uninvited guests and consequently after some practice they lose all their power and cease to come into the focus and will never bother during meditation.

During the entire period of meditation, one has to keep oneself quite alert and attentive and observe the subtle changes taking place in the psychic centres of his body particularly in the heart region. Sooner or later the seeker starts perceiving and experiencing the transmission of the cosmic energy or the cosmic consciousness. This perception takes up different routes in different seekers since not all of them are of the same psychic make up.

Despite innumerable variations and differences in the procedure adopted during meditation advocated by widely different cultures, religions, and epochs, the accumulated store of facts reveals the existence of certain amount of universal and common ground so far as the content of the impersonal experience during the meditation is concerned. The knowledge can be shared and, more important, be verified by others. The general benefits that accrue out of meditation on the material plane have already been referred to. Similar and varied general experiences can also be identified on the psychic plane as chiefly due to meditation.

The Innumerable mystic experiences have been classified by Deikman (1969) as sensate or cognitive with strong emotional and vivid Perceptual contents and transcendent experiences that reach beyond the usual sensory modes and perception. The sensate type of experiences are precipitated by Nature and drugs like L.S.D., Marijuana, Chloroform, etc., in people from all classes and occupations without any religious background of meditation or prayer etc. These are usually the extensions of common psychological process. Religious persons seeking union or enlightenment by long practice of concentration and renunciation experience phenomena which conform closely to the religious teachings and beliefs. These mystic experiences gradually fade away leaving only a memory or a deep craving for the experienced state. In the long trained, well stabilised, deep core of meditators the content of the experience gradually passes from the initial lesser sensate type to the final state of transcendental type of experiences transcending all the limitations of sensations, perceptions, ideas and even human intellect and rationality. These are the experiences of the Reality which appear as ineffable, profound in significance, uplifting in nature making one feel pleasure, emotionally rewarding, highly valued in quality. At this stage one reaches

a point where one need not struggle against distracting stimuli either from external world or from the interior of the body including the wild and unwanted thoughts. These can be kept out with ease and equanimity and with least effort, more less automatically. Sooner or later one may even enter into a stage where he experiences an almost thoughtless state or the Bliss of the silent mind. This state is praised very highly in all literatures. The mystic then is passive and has abandoned striving and positively experiences the descent of cosmic consciousness on to him. A state of being in being which can never be communicated to others is also experienced.

The repeated performance of any act leads to the mechanisation of the process involving the somatic systems, integration of the cerebral acts like perception and thinking. This results in the disappearance of the intermediate steps from the consciousness as a measure of economy and efficiency of the body function. This is what is referred to as Automatization of motor behaviour by Hartmann (1958). Gill and Brenmann (1959) developed the concept of Deautomatization wherein the process of Automatization is undone by reinvestment of actions and precepts with attention. Deikman regards mystic phenomena as a consequence of this process of Deautomatization. Shri Ram Chandra (1959) refers to 'Negation', as an important process in the spiritual advancement.

A positive condition of personal attachment to the Guru, or preceptor or the object of meditation is developed in the meditator after some time and it would be very difficult for one in the earlier stages of sadhana to think of meditation without the presence of this most cherished object. The principle involved in the practice of meditation, as recommended by the seers of the ancient times, follows the technique of transference commencing with idol to image to thought to thought-force and finally to reality. In Sahaj Marg idol worship is rightly discouraged and the practitioners meditate keeping the concept of the Ultimate in view.

In the past, there were periods when mysticism and mystics remained totally aloof from the world instead of making the world richer by their extraordinarily rich and varied experiences. Some have even gone

to the extent of denouncing the material world completely. Whatever may be the justification or otherwise this necessarily removed the cosmic consciousness and its awareness from the realm of materialism and the people in general resulting in the perpetuation of the dichotomy of matter and spirit rather than their synthesis.

The experience of a person of the world takes the routes of objectivity, i.e., the experience of objects observable and verifiable by others and of subjectivity, i.e., which is well within the distortions and limitation in the makeup of the subject that is undergoing the states of consciousness, upbringing in the society, above all the training in life in general would help immensely in experiencing and comprehending the world outside. As a result of continued meditation, one is thoroughly grained in the reversal of the very nature of the experiences. The role of the subjective element with its prejudices and limitations is kept at a minimum while the objective approach gains preponderance. Further, this restriction on subjective element results in the lessening and gradual annihilation of the ego of the seeker since self-seeking personal aggrandisement and egocentric acts are positive hindrances and obstacles on the path of spirituality. A synthesis and a dynamic equilibrium between matter and spirit can be achieved only after the loss or annihilation of gross personal ego.

TRANSMISSION

Two types of memories prevail in the lives of every individual. The first one is a short-term memory involving the retention of the experience or the knowledge or the information for a relatively short period. Innumerable examples can be cited from day-to-day lives which can be listed under this category, and most of these concern trivial or insignificant matters, though at the exact moment of their happening they seem to be very important. These are mostly details rather than the content. Next comes the permanent memories which are retained in the cerebral cortex and recalled with ease or difficulty. These are the ones that shape and mould the personality, and consequently the very ability, to function in the society.

Hindu philosophy has identified and propagated the doctrine of karma since time immemorial as one that is solely responsible for the existence or otherwise of individual men of various levels and standing in the society. This karma which is the fruit of one's own actions may, in terms of modern concept of memory, be interpreted as eternal memory. It is known that the infinitesimally minute electrical activity passing through the reverberating circuits in the cortical layers (or elsewhere) of brain and the biochemical changes produce the permanent memory trace or Engram. Such traces while being imprinted indelibly on the matrix of brain may also simultaneously produce a still more subtle effect in the consciousness, or in the soul or elsewhere, in the being of the individual person, in a symbolic manner. All these cumulative, latent and symbolic impressions of several lives form the very basis of eternal memory or karma. How and where it is stored is a matter beyond the possibilities of science, but the present theories of memory provide ample scope for their extrapolation from mere physical experiences or actions together with the concomitant thoughts to subtle electrical processes resulting in Engram and from thence to still subtler impressions (samskaras) which ultimately lead to the formation or even deletion of karmic matter (not precisely

matter). The very crux of yoga, according to the greatest seers and Hindu religionists, lies in dissolving or getting rid of this karmic matter that has accumulated in the being of an individual; and without effecting this it is not possible for anyone to move on the path of spirituality and reach its highest pinnacles.

The Doctrine of karma, though Interpreted In different ways by different systems in the west, holds in the final analysis that the law of action and reaction, or of merit and demerit, governs all life and more so the human existence. As one sows, so he reaps. Additional karma-matter in the form of evil and good samskars are added to core of the individual's psychic being resulting in the misery and bondage of the individual. This state of misery and bondage keeps one away from experiencing the Cosmic Consciousness owing to the veils of karma-matter forming obstructions to the perception. These latent impressions of one's own actions and deeds have been categorized as (1) archaic and original, (2) cumulative and (3) recently acquired, representing different levels of subtleties of the grossness of the psychic being of an individual, ancient seers of the orient have, through long practice and intuitive insight, perpetuated certain techniques for removing this karma matter grossness from the psychic system. The obstructions or dross in the system can either be thrown out or burned out with the help of heat' produced by the individual during penance. This can also be achieved through the extraneous meditation of a competent person or Guru who can help the seeker to throw out all the grossness with help of transmission of the cosmic energy i.e., a subtle type of potential energy which is readily and freely available for all those who can tap and use it.

The uniqueness and efficiency of the Sahaj Marg system of Raja Yoga lies in the fact of its transmission. It is not a mere supposition or hypothesis. It is practically demonstrable, and it can be experienced by one and all. The transmitted cosmic energy at the very initial stages of entry confers certain psychic traits on the seeker very easily and even without any effort on his part. Mental attitudes which are obtained in other systems after decades of hard practice and with lot of striving and difficulty are easily acquired in this system. The transmission of cosmic energy does immediately relax and cleanse the system besides calming the restless mind. Triple fold benefits, among several others that can be

attributed to the transmission under this system at the very beginning are (1) De-tensioning, (2) Calmness and peace and (3) Cleansing of the system of the grossness that has accumulated and preventing further accumulation of grossness.

Electromagnetic spectrum of energy indicates the range of variety of radiant energy. All radiations travel at a speed of 1,86,000 miles per second (300 million meters) and have a wave length that can be measured as the distance between two consecutive troughs or crests of the waves. The wave lengths vary with the amount of energy contained. Electric waves containing practically little energy and few thousands of miles in wave length constitute the largest waves of the spectrum, while the smallest of all are the cosmic waves of the order of .0001 Angstrom units (one A.U. -1×10^{-8} cms) in length and highly packed, with energy. In between are located the T.V, waves (hundreds of miles in length), Radio waves (hundreds of meters in length), Infra-Red, Visible light (4-7 thousand A.U.), ultraviolet, X-rays and gamma rays etc., in the descending order of the wave lengths. Any specific portion of the spectrum is known as a Band.

The very basis of all life on this earth is the solar radiation of which light is a small integral part. It is that specific band of the radiant energy to which our eyes are sensitive and hence we have sense of sight. This visible light is of particular interest in view of the fact that the ultimate particulate, quantal unit of light known as a Photon' behaving as it does both as a wave and a particle (hence a wavicle) is absorbed into the biological systems during the photochemical reactions of the photosynthetic process of the green plants, forming the very basis of energy for all living forms either directly or indirectly. There can be no life on this planet without Solar Radiation (Bayliss).

The contribution of modern physics is that tremendous amounts of energy can be released out of the ever-in-motion subatomic particles of matter by application of force of the greatest intensity. Interconvertibility of matter and energy is expounded by Einstein's equation. Matter is being formed. Anew in the Cosmos from the already existing energy. Universe develops, changing continuously and conforming to eternal and basic

laws valid both for the entire universe and each part of it including electron. The universal process of transformation of energy is an uninterrupted chain of increasingly, complicated interrelations of matter. Nature abounds in ambient energy which as per the law of conservation of energy (First law of Thermodynamics) appears in several forms such as heat, light, kinetic energy, chemical energy, electrical energy, mechanical work and so on. Energy changes its form and this transformation of energy is evident every- where. Matter is a latent form of energy. The same fundamental laws govern the transformation of energy whether it be in the gyrations of the distant stars or proximal planets and in the processes occurring in them, or in the animate sphere involving the life and manifestation of human personality in particular or inanimate processes on earth; or in human society with all its complex external or socio-economico-political core-lates Human Reflexology concludes that the inner aspects of phenomena discovered by introspection cannot wholly be an attribute unique only to man or animals. In some form, Rudimentary or potential, this principle is found- both in vegetable and inorganic matter throughout the Universe. A living system like any machine, needs a continuous supply of energy for its operation. For its work, and more so, for its growth maintenance and reproduction energy must be expended. The uptake and expenditure of energy in the living forms is an extremely fascinating problem of greater importance than the budgets of all Nations. Innumerable chemical substances undergo a lot of jugglery in an uninterrupted manner within the living organisms and to this the term metabolism is applied. Energy is exchanged between the living system and its environment. It is not possible for life to exist on this planet without solar radiation since, in the final analysis the energy from sun light is trapped by the photosynthetic plants only to be released during the biological oxidative processes of the living systems. Thus, the metabolism of the living system is a basic mechanism for transformations of energy.

Living beings bring about transformations on systems of energy. Metabolic processes involve the transformation of substances into energy. The primary cycle of events including action-reaction system of the physiological environment and the organism leads to the transduction of different forms of energy into Bioelectrical energy. Further the sense organs like the eye, ear, nose, tongue, skin etc. pick up various modalities of energies impinging on them in the form of stimulations, and convert

them through a process of bio transduction into infinitesimally small electric signals called nerve impulses. This leads to neural processes which finally culminate in psychological processes. These influence, in their turn, the psychic entities like mood, mind and finally consciousness. This reveals a whole series of transformation of energies of different types taking place incessantly during the life of a man. All along the chain of events leading finally to human behaviour, interactions take place where the energy is transformed from physical or chemical stimuli into physiological reactions or processes and from thence finally into psychological and mental states.

While the midportion of the Electro- magnetic spectrum supporting photosynthesis forms the very basis of life in general on this planet, the other extreme of the spectrum i.e., Cosmic energy is used for the Cosmic evolution of the human beings. These waves containing tremendous amounts of energy have got to be, so to speak, transformed or mellowed' or stepped down from cosmic dimensions to human levels before they can be made use of as force for upliftment. Something, some unknown and unique process, in the technique not only deals with the cosmic waves of space and taps the energy but also converts this energy into consciousness-force. Sahaj Marg offers a simple explanation and demonstration of the interconvertibility of matter and consciousness-force.

In mystic circles and in Hindu philosophy it is expressed that all attempts towards cosmic evolution can fructify only on this planet, the Mother Earth. However advanced may be a soul, perfection and union with the Ultimate cannot be attained without the base of this planet. Sometimes the souls who are not yet perfect demand help from the saints of calibre who are living on this planet. The spiritual implications cannot be so very easily verified. However, Henderson (1914) has discussed the reciprocal fitness of Earth and living matter and concluded that Earth is the fittest of all suitable Biological environments for corporeal life as we know it on this planet. There is no corporeal life on other planets.

Different individuals of a single group of meditators (Satsangh) experience and react to the Transmission of cosmic energy into their

system in innumerable different ways. These mystic experiences may, in the initial stages, be in the form of:

1. Vision : Symbolic objects of mysticism like a lotus, sky, ocean etc., or stars or lights of different colours and intensities ; images of divine beings or saintly persons of yore are experienced distinctly.
2. Audition : Sounds like ringing bells, blowing conches, ecstatic music, recitation of hymns, etc., may be heard.
3. Olfaction : Smell of fine scents, odour of flowers may be perceived.
4. Gustatory : Sensation of Sweet nectar or honey.
5. Vibration : Tactile sensations like tickling, itching, throbbing or perceptions of regular vibrations having a frequency code.
6. Thermal: Feeling of heat radiation and warmth or cold or chills.
7. Temporal : Suspension or elaboration of time.
8. Spatial : Loss of coordinates of space and boundaries of objects.
9. Electrical : In the form of flow of electric energy in the body.
10. Kinaesthetic : In the form of loss of the sensation of physical body or parts thereof ; experience of expansion of the body to the limits unknown.
11. Gravitational : In the form of centrifugal forces resulting in the development of extremely great pressures, comparable to the 'G' forces experienced by Astronauts during space flight, causing giddiness and nausea or experience of extreme lightness of body and floating as Would happen in levitation.
12. Magnetic : In the form of a sudden pull or attraction towards the source of transmission.

One can observe from the list that how-ever much elating and pleasurable these experiences may be in their content, there is yet some sort of involvement of sensory apparatus or more so the intellect and the subjective aspects of the person. By their very nature they constitute the initial steps in the long trek on the road of spirituality. At this juncture a note of warning may be quite appropriate. While the genesis of these experiences cannot so easily be explained it would be prudent for one to keep in mind that most, if not all, of these experiences are not at all needed absolutely for the upliftment or the evolution. Of the individual. As an

analog they may be regarded as mile-stones on the road of spirituality. Some persons may not have most or any of these same experiences at all but all the same their onward march is not at all hampered. Any mystic experience gained during meditation is quite often got only once. It never recurs or repeats in the same manner.

As the practice of meditation gets stabilised in course of time the seeker gets established in the line of transmission and this simultaneously pulls up and pushes from below so that one moves on and on shifting his place from one alert state to another alert state till he reaches the super alert state of the Transcendent. He grows in transmission, becoming more and more deep in his Being, from one psychic point to and moves another psychic point till he reaches the advanced state of individual evolution in cosmic life. Neither all the languages and the vocabulary that has been in existence nor all the means of communication at our disposal can be of any avail for one who has experienced these higher transcendental states to convey the impressions to other fellow beings. The human intellect and rationality finds its termination at this state. It is the language of the being which can be labelled as consciousness pure and unadulterated or unalloyed by subjectivity, i.e., Original Consciousness that can discern these stages in the higher levels of evolution.

PSYCHIC CENTRES

References in mystic literature to the different bodies of the human being are innumerable. In addition to what is apparent and obvious, man is known to possess subtle bodies called psychic body, astral body, causal body and soul. The psychic being is described as capable of existing in vital, mental, astral and spiritual planes. The causal body is described as the very root cause of the existence of man. These bodies being very subtle in nature, they can be dealt with only in a subtle way. The physical body is superposed on the psychic being. During life the psychic being is necessarily connected with the physical body, by way of the higher cephalic functions of the latter. The relationship is mutual and reciprocal. The complex of Thought-Mind-Consciousness forms the very connecting link between the gross and the subtle bodies of the human being.

Hindu and other philosophies believe in the transmigration of the psychic body from one individual body leaving it permanently resulting in the death of the individual, and entering, after a variable period of sojourn in the ethereal space or on other planets without any corporeal body, another body quite early in its intra-uterine existence. Part of the psychic being leaves the physical body, though temporarily, as in dreams and gives us the vivid and elating experiences, or as in 'parakaya', that was in vogue in earlier times about which references are found in yoga literature. The doctrine of karma dictates the general direction of the movement of this psychic being in the endless cycle of births and deaths. It is believed that many lives are needed before an individual embarks upon the path of Cosmic evolution, and many more lives are being needed for the completion of the yatra (spiritual journey) and the attainment of Realization of the Ultimate.

Parallel to the organ systems of the physical body the psychic body also is known to possess several sheaths (Kosas) like Annamaya (Alimentation), Pranamaya (Bioenergy or life), Manomaya (Mind), Vignanamaya (Knowledge) and Ananda- maya (Bliss). These divisions of the psychic being are the major aspects of linkage or bondage. Depending upon the level of cosmic evolution of psychic being, the functions associated with these divisions predominate and dictate the actions of the physical body. Unless these divisions of the psychic body are uncoupled by yogic techniques, their subtle effect on the body cannot be brought under control or removed, and the cosmic evolution may be hindered to that extent.

Kundalini, Tantric yoga and Hatha yoga systems have given an elaborate description of the psychic centres (Lotuses) located in the psychic body. Their exact location, nature of the resident energy, colour, mode of activation, etc., have all been described and a lot of attention was paid to the activation of the kundalini power (serpent power), resident in the Muladhara chakra (centre) at the base of the vertebral column in the navel region. This power lying dormant in the form of a coiled serpent, hence the name of serpent power, has to be activated and taken up through the several chakras of the abdomen and thorax namely Swadhisthana of the genitals, Manipuraka of the umbilicus, Anahatha of the heart, Visuddhi of the throat region, Agna of the eye brows and finally

the Sahasrara located at the crown of the head through the medium of Sushumna Nadi. The specific types of energies that are contained in these six chakras are called respectively as Dakini, Rakini, Lakini, Hakini, Kakini and Sakini. These six centres or the Shatchakras are the very basis of one's own personality and are concerned with the Ego of the individual. They mediate Mada, Matsarya, Moha, Lobha, Kama and Krodha commonly known as Arishadvarga. These psychic centres are hardly useful for liberation or spiritual upliftment of the individual since the power resident in them is mostly used for action in the material world rather than for meditation purposes. After reaching the Sahasrara (Thousand petalled lotus) the soul is said to leave the body through an opening called Brahmarandra or Aperture of Brahma resulting in the death of the body and liberation of the soul. This is known as videhamukti (liberation without body). Other schools advocated Sadeha Mukti stating that it is possible to have liberation even while retaining the body. However, these systems regard Sahasrara as the culmination of yogic training and hence no reference whatsoever exists to any psychic point beyond Sahasrara.

Attempts have been made in the earlier times to establish correlation between psychic centres and the anatomical structures (physiological centres) of the body. Woodroffe, after post-mortem examination, could not find any specific structures indicating the presence of psychic centres in the region below the heart. He could find only nerve plexus or net work formed by nerves. However, claims have been advanced, time and again, by many, that the psychic centres can be visualized with the aid of special vision possessed by certain individuals of high attainment in the field of spirituality.

The metaphysical assumption, "As is the Macrocosm so too is the Microcosm" (Vatha Brahmande Tatha Pinde) is being more and more recognized by science today.

While describing the parallelism between the cosmic manifestation and human genesis Shri Ram Chandra gives a very lucid account of the formation of the psychic centres (or granthis or points or knots) in the human being. The psychic levels of Heart, Mind and the hitherto unknown Central region, placed in the frame work of human anatomy reveals that these regions are inter-connected and reproduced in the very human

being. Shri Ram Chandra describes 6 points or knots including the seat of the soul and in addition to the points A and B which help the seeker to clean his system from grossness and the point of inter communication with departed souls all located in the chest region and representing the Heart region of the spiritual journey (Yatra). The next higher point Agna Chakra is not touched during the training in this system and is passed through very quickly since this point is full of material energy and when awake gives an unrefuted control over the Nature. Ordinarily this point alone takes years and years to pass through. In ancient literature this point is referred to as Trikuti. One enters the Brahmanda and later Parabrahmanda levels of evolution during the travel through the next four points located in the front and top of the Brain. These represent the mind region of the spiritual journey. After the completion of the journey by a sadhak of these heart and mind regions the mind becomes permanently calm, and peace of a very high order and extraordinary psychic quality prevails. A state in which thought is regulated is achieved. Further beyond one enters the Central region more or less confined to the back of the head and including the points 11 and 12 and finally the central point represented by the 13th knot. The descriptions of the characteristic states and levels of anubhava (experiences) of the regions and higher points beyond Sahasrara comprising the Parabrahmanda and Central regions are entirely due to Shri Ram Chandra's untiring researches. These are the points or centres of conversion of particles into potential energy that is utilized for the cosmic purpose of transmission. During the transmission by Pranahuti these knots are loosened so that the ascent and descent of the flow of the energy becomes quite possible. Further he has also referred to quite a number of points located at the sacral region and elsewhere along the back of the human body each having a specific function to be discharged.

The psychic centres not only get cleansed during the process of transmission but the inherent and characteristic energies lying dormant in them also get awakened owing to the removal of grosser effects settled on them. When the higher psychic centres located in the cephalic region get awakened due to the flow and the subsequent effect of the cosmic energy they begin to throw their influence on the lower centres. After a period of exposure to superconscious states the lower centres begin to merge in the higher centres enabling the latter to take complete charge of

the former. This psychic process is comparable to the progressive dominance of the cerebral centres of the C.N.S. over the lower and spinal physiological nerve centres,

Psychic centres below the level of heart region are full of material power and their activation is not needed for the spiritual upliftment and cosmic evolution of an individual. On the other hand they may even be a hindrance on the path of realization. Hence these are not at all considered and taken up in this system of yogic training by Pranahuti. However, when one reaches the higher levels of advancement they get automatically cleansed of their grossness and become active.

Shri Ram Chandra's researches into the psychic states of the human individual constitute the greatest of the psychic discoveries of our times, if not of all times. He reveals that there are innumerable psychic centres, knots, granthis or points located in the human anatomy of which thirteen psychic centres commencing from the region of the physical heart and culminating in the final centre located at the back of the head near the occipital prominence are the crucial points to be traversed by the individual during his spiritual journey or yatra towards the realization of the Ultimate Absolute. Curiously enough this space of about 18 inches (45 cm) of the human frame, from chest to the crown of the head and from there to the lower back portion of the head, for the unravelling of its multifold psychic levels of existence, required several millions of years in the earlier times for any serious aspirant of the Reality. Hence the saying 'Bahunam Janmanam.' Multitude of lives are needed for the completion of the yatra. Miraculously, now, under the guidance of Shri Ram Chandra and with the help of his transmission, it is possible to complete the yatra in the span of a single life.

Ancients have made references to the chakras (lotuses, points or granthis) and considered each as a store house of certain type of energy but they never regarded them as centres of power or batteries capable of transforming one type of energy into another, and one kind of vibration (or cosmic meter) modulated into the other. These psychic centres, at a higher level, are both transducers and modulators. Followers of Sahaj Marg are given the experience of this transformation of energy and the

modulation of vibrations yielding tremendous amounts of energy which could be used for spiritual upliftment of the individual. Though on morphometry, anatomical and physiological scale this distance is very meagre, when translated in terms of psychic, experiential and evolutionary scales the fact that millions of years are needed to traverse this distance becomes obvious since this verily represents not only the Universe but still higher levels also.

After awakening of the gross heart to the Divine vibration of the transmission into it through Pranahuti, the heart begins to glow with the light of the Divine thought contained in it. The psychic purification of the dross and grossness of the points near the heart helps one to perceive the light within resulting in calmness and lightness. Now the individual is said to have awakened to the real purpose of his existence and begins to aspire strongly for Divine life. The spiritual journey involves several points and subpoints from heart to the central point of central region through mind and central regions. After sufficient practice in meditation sadhak gains his entry into a certain centre or knot and tours the place for some time in order to gain a thorough experience of the characteristic condition of that knot. During the sojourn of the point, he absorbs the state prevailing in that knot and finally becomes saturated with it. Then he is said to have merged into the condition of the knot and this merging' is known as Layavastha (state of merger). Since the consciousness of the condition, newly gained. Also exists he has to travel for some more time so as to acquire a state of settledness which is termed Identicality or Sarupyatha (state of identicality). This also is not the final experience of the point. He has to develop in him a still finer state of Sayujyatha (state of close conformity) where the impression of the states of both merger and identicality also become completely lost. The experience recedes, leaving a faint impression in the back ground. Now alone the knowledge gained about the point is complete and the seeker now proceeds with his search for the next higher state of knowledge represented by another higher point. At all these points the processes of Samipyatha (Nearness), Saralatha Saralatha (Facility), Layavastha (Merger), Sarupyatha (Identicality), and finally Sayujyatha (Conformity) have got to be repeated laboriously in order to attain the full knowledge resident in that point. The experience of several people during meditation of oneness,' merger' and 'oceanness', etc., and the feeling of the loss of the mystic experience

gained during meditation can very well be considered as due to these important processes of the yatra. These are biological processes of higher order and concern the evolution of consciousness into Superconsciousness. It is obvious that, as in the Case of other Biological processes, passage of time is a necessary corollary and hence these stages cannot occur simultaneously but on the other hand need several years (or even decades) for their completion.

CONSCIOUS AND SUPERCONSCIOUS STATES

As a consequence of the Ecosocial conditions of existence man has to necessarily think. It is but natural for the brain produce thoughts. Ordinarily, and in the normal course of events, the thoughts stop forming completely, as the heart fails pumping, at the time of death. The thoughts lead to the memory traces or Engrams. These Engrams lead to the collective memories of life which in their turn lead to the formation of Eternal memory. The outcome of the cerebral integrations of experience (knowledge) and thought is Consciousness built up of simpler unconscious elements. Ordinarily one experiences a waking consciousness, a semiconscious state in drowsing or dreaming, and an unconscious state in deep sleep. That the waking consciousness gets influenced by the events taking place both inside and outside of the body to a lesser or greater extent, constantly undergoing changes both in quality and in quantity, is a universal phenomenon and a Common experience. Several attempts have been made to define consciousness as state of being conscious or as a totality of a person's thoughts and feelings, or of a class of these or as a state of being awake, characterized by the ability of the individual to react adequately to his environment' or as 'Awareness with reactivity'. Consciousness is a relative state possessing two basic components awareness and reactivity. Ordinarily, when consciousness is impaired or disordered, awareness and reactivity also suffer correspondingly. In pathological cases reactivity may be partially or totally lost without attendant loss of awareness.

So far as the content of the thoughts of an individual at different times and of any two individuals in a society is not exactly identical, so also the consecutive states waking consciousness of any individual or of

two individuals cannot be described as identical. Thus, it is not possible to identify any state as a 'Normal' state and as a reference point of an individual. Only continuously changing or Altering States of consciousness (A.S.C.) are experienced during the life of an individual at different times. A vivid and clear subjective experience of a quantitative diminution or accentuation of the sensory, motor and other higher functions, and/or a qualitative shift in the very mental makeup and the faculties. Is experienced consciously by the individual during these altering states of consciousness. Some of these states are highly elating, ecstatic, rewarding and take the individual to the very heights of living. These are most cherished for their psychic nature and effect on the mental processes and also on the physiological processes of the body. Alternately certain A.S.C. can cause depression, displeasure, and take the individual to the very dark depths of existence resulting in Melancholia, Paranoia, Insanity, etc., shattering the very personality to pieces.

Owing to the pleasurable, ecstatic and rewarding nature of some of the A.S.C. man has assiduously striven for the repeated production of these states by using innumerable techniques. Drugs, Alcohol, and other psychedelic materials, religious approach in the form of prayer, bhajan (singing), fasting, austerity and meditation have been used by men of various cultures and creeds since time immemorial, and the result is that multitude of states of consciousness have been experienced. It is true that some of the states like hypnosis, hallucination, autosuggestion, 'Trips', hysteria, dream, ecstasy, trance, Satori, Nirvana, Samadhi and finally Super-Consciousness including the whole gamut of states varying from mere material and mundane states to purely psychic and spiritual states have been regarded as the different main categories. At the present juncture an unprecedented upsurge is being experienced more or less on a global scale for the experience and verification of the A.S.C., though in a multitude of ways, i.e., physiological, pharmacological and psychological, resulting in the origin of new branches of human psychology. The literature abounds in examples and descriptions of these states but common definitions for the important states are forthcoming. On the other hand, a lot of contradiction and confusion prevails. However, irrespective of the actual nature and content, the A.S.C, are somewhat related phenomena. A number b of basic, salient features such as:

(1) Alternations in thinking; (2) Disturbed time sense ; (3) Loss of conscious control resulting in helplessness only to gain greater control and power through dependency; (4) Change of emotional expression from ecstasy to profound pain and depression, or lack of any emotion resulting in detachment and lack of sense of duality ; (5) Change in body image resulting in depersonalization and experiencing the duality of the body and soul, or experiencing of lack of boundaries between self and others, world and cosmos resulting in oneness or expansion of consciousness or 'Merging'. Various parts of the body are experienced as enlarged or shrunken, heavy or weightless, disconnected, resulting in dizziness, numbness, tingling. Etc.; (6) Perceptual distortion resulting in hyperacuteness of perceptions and illusions of every kind, or in the translation of certain kinds of sensations from one modality to the other; (7) Change in meaning and significance resulting in attaching a very much exaggerated meaning or significance to the subjective experience, claiming genuine meta-physical revelation ; (8) Sense of the ineffable, feeling of inability to communicate the experience to others ; (9) Feelings of rejuvenation, a new sense of hope, rebirth; (10) Hyper-suggestibility have been identified (Ludwig, 1969) as commonly shared by these A.S.C.

Most of our information on A.S.C, is chiefly based on the verbal reports from the persons experiencing these or some of the A.S.C. The systematic study and particularly the psychophysiology of the actual behaviour of the persons in A.S.C. amounts practically to nothing. In so far as their clinical, emotive and therapeutic implications leading to a better understanding of A.S.C., are quite desirable, a way of producing some of them more effectively is to be achieved. Electroencephalographic (E.E.G.) pattern of the brain waves of the meditating Zen monks (Kasamatsu & Hirai) ; yogis (Anand et al) and others (Kamiya, Wallace) have been studied in the recent times. Pronounced alterations in the brain physiology during the A.S.C. produced by these Zen, Yoga. Experimental and Transcendental meditation systems have been recorded. The adept practitioners of these systems of meditation showed almost continuous Alpha waves which are characteristic, normally, of relaxed alertness in ordinary people. The transcendental nature of yoga meditation has been found to be confirmed not only in the absence of any E.E.G. response at all to sensory stimulation during meditation but also in

the total unawareness of the stimulation. Joe Kamiya recording E.E.G. patterns of ordinary subjects trained in Experimental meditation found the high Alpha rhythm state in his subjects also which is similar to those produced by Zen monks and yogis after years of meditation. This cannot be a conclusive proof to state that the specific states of consciousness experienced by ordinary subjects, Zen monks and yogis are one and the same. Similarly, greater increased Alpha rhythm has been found to be present in trance state. Further it is recorded that a practitioner experienced consciousness as being located ' at a point above the physical body. The brain activity of a yogi in samadhi state has for its basis a type of Consciousness which is referred to as Superconscious state. Continuous radiation, for long periods, of the waves from the brain of a Yogi in Samadhi is believed to control the electrical disturbances experienced in the brain of an epileptic and cure the disease in course of time. Claims have been made by men of religion and people of standing in spiritual practices that certain types of ailments including mental disorders can be set right by transmitting spiritual energy or superconsciousness to the sufferer.

Certain amount of confusion prevails in the literature as to the nature and the very concept of Superconsciousness. Often it is referred to as though it is a single and uniform state despite the fact that several nouns are used in yogic literature depicting the different states of Superconsciousness. Those who have had access to the higher levels of consciousness can experience, as in waking consciousness, quite a large number and different levels each varying both quantitatively and qualitatively from the other. Shri Ram Chandra in his 'Efficacy of Raj Yoga in the light of Sahaj Marg' has clearly delineated the main categories and different levels of Superconsciousness. The levels of Superconsciousness, indicated by letters D, D1, D2, and finally D3,} referring to the different levels of Divine Consciousness have been clearly located. The most crude and inferior type of Superconsciousness of which Sushupthi is only a part resides in the upper portion on the right side of the physical heart. To the left, the heart contains points A and B. The location of the points A and B, their role in cosmic evolution have been clearly described. These two points have got to be kept purified and cleansed of grossness. A thorough purification of these A and B points simultaneously results in the cleaning and purification of B, and As, B,

located at each of the higher centres in the front (forehead), top (crown) and back (occipital prominence) of the head respectively. Superconsciousness of different levels labelled as D1, D2, and D3, resides at these higher centres, respectively. D1, is the superior part of Superconsciousness resident in the upper part which lies on the left side of the centre in the forehead. D2, is a superfine state of Superconsciousness located at the centre in the crown of the head and lies in the upper part which is located on the left side of the centre. D3, is the Superfinest state of Superconsciousness residing at the centre of the back of the head in the upper part, in the right side of the centre. This represents the last and final stage of Superconsciousness and may be regarded as Original State of Consciousness which is reserved only for incarnations of the Deity, or under special circumstances it is bestowed on the Special Personality that has come to effect the over-hauling of Nature. In addition to these major categories of D, D1, D2, and D3, different levels of Superconsciousness exist at every knot of the psychic being and these levels have to be transcended in order to get at the final and ultimate level of superfine Superconsciousness. These states of Superconsciousness have to be transcended to arrive at the potentiality, and even the potentiality has to be left behind to arrive at Reality.

All the rationality, mental powers and thought processes will be of no avail in comprehending these Superconscious states since they are all above the level of the higher functions of human brain. However, one can experience, though not understand in terms of rationality, and describe and convey it to fellow seekers. It can be verified and the truth of the existence of these states be established for one's own sake though not for the sake of all humanity. Thus, the effort becomes purely personal and highly individualistic. While enjoying the Superconsciousness states one steps into the realm of intuition which alone can help one to grasp the Reality. A person living in the world and obtaining all his empirical knowledge mainly and basically through his sensory structures has to transcend his senses and operate through the medium of his thought and mind. The thought after being purified and brought to original state, where the influences of Time and Clime is no more felt, takes off into the realm of intuition which alone can deliver the final goods to the seeker of Reality.

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