

Spirituality and low-entropy culture: A synergic vista of the 21st century

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Resumo

A mente humana possui duas dimensões inatas: a primeira projecta-se nos desejos sensoriais; a segunda, transcende os sentidos e experiencia a consciência iluminada ou a visão espiritual. É unicamente a busca do espiritual que pode controlar os desejos sensoriais e, como tal, levar à baixa entropia, se não mesmo a uma entropia livre. As suas sinergias poderão promover uma prospectiva da vida comunitária, com significado, baseada em experiências partilhadas sobre a universalidade. Esperamos que o séc. XXI constitua um ponto de partida para as sinergias da espiritualidade e da baixa entropia, recolhendo a sua inspiração nos conceitos tradicionais e antigas práticas culturais. Assim, esta comunicação pretende reflectir sobre a tradição espiritual Hindu, a sua visão acerca do homem na natureza e não do homem contra a natureza.

It would be naïve to think that the celestial and the terrestrial, the macrocosm and the microcosm, are disparate. Indeed the two are inseparable, though the nature of terrestrial disorder is apparently different. During the last couple of centuries, human societies all over the world have been tending to be increasingly entropic for satisfying material desires through the instrumentality of science and technology. This has been resulting in irretrievable imbalances and disorders between man and his environment in diverse ways. The survival of mankind on the matrix of the cherished values of life – values that distinguish humans from animals and also those that augment humanism – is dependent upon its adoption of sustainable

low-entropy living patterns fortified by harmonious and symbiotic relationship with the environment.

Human mind has two innate dimensions – one: towards sensorial but insatiable desires; the other: transcending the senses and experiencing an enlightened consciousness or spiritual vision. It is only the spiritual pursuit that could control sensorial desires and thus engender a low-entropy, if not an entropy-free, culture. Their synergy will open up a vista for a meaningful community life with shared experience of universality. One hopes that the 21st century will be a harbinger of the synergy of spirituality and low-entropy living, deriving its inspiration from traditional concepts and practices of ancient cultures. In this connection and by way of an example, the paper, while presenting its main theme, will also reflect upon the Indian spiritual tradition, its vision of man in nature, and not man against nature.

There is no denying that the amazing achievements in science and technology have perceptibly enriched several dimensions of our material living. Nevertheless, in the midst of these spectacular achievements, there has been an increasing concern over the steady deterioration of human values or dehumanization that has surfaced in all cultures in one form or the other. About nine months after the dropping of the first atom bomb in 1945, Albert Einstein observed: 'I believe that the horrifying deterioration in the ethical conduct of people today stems primarily from the mechanization and dehumanization of our lives – a disastrous by-product of the development of the scientific and technical mentality. I do not see any way to tackle this disastrous short-coming' (*Albert Einstein: The Human Side*, (eds) Helen Dukas and B. Hofmann, Princeton University Press, N. J. 1979, p. 82). Einstein was thus emphasizing the fact the scientific and technical mind-set or attitude alone, though it is enormously productive, does not and cannot lead to a value-based ethical, harmonious life.

About a decade later, Bertrand Russell and Einstein, in their *Manifesto* (July, 1955), exhorted: 'We appeal as human beings to human beings. Remember our humanity, and forget the rest. If you can do so, the way is open to a new Paradise; if you cannot, there lies before you the risk of universal death'. It needs to be recognized that human progress or what is labeled as 'development' is a two-in-one concept; namely, one, the harnessing of natural resources for elevating the material life; and the other, the refinement of man into an enlightened human being. Science as well as its application is one side of the coin; human refinement is another side. Each

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in itself is incomplete; while the blend of the two would be complete, a totality.

Scientific attitude is perhaps the best for an acceptable understating of Nature in all of its manifestations. But a reflection on the past reveals that, over the ages, what was assiduously fostered was the inseparable relation, Man **in** Nature or Man **in harmony** with Nature, in contradistinction to Man **and** Nature or Man **against** Nature that characterize modern scientific approach. In the ancient cultures the general inclination or approach was towards the experience of Oneness; towards unity amidst diversity in the physical and the biological world alike. Such an approach was largely governed by what mattered most for a meaningful human existence and what cemented most the interrelationship of self and the ambient non-self. More importantly, it also envisaged a concordance or consonance of Life, Matter and the Universe with holistic vision.

The Big Bang Scenario

The modern approach, through it traverses a different pathway, has now begun to assume new significance with some awe-inspiring conceptual developments in cosmology and related fields. One of the most favoured current theory, its limitations apart, about the origin of the Universe is the Big Bang scenario concerning the very first moments of the physical universe. To quote John Boslough (2, 1992) who has given a vivid narration of this scenario.

'Into a void, so absolute as to mock any human concept of emptiness, appeared a single point of raw potential. At the very instant of its creation, this point bearing all matter, all dimension, all energy, all time, burst out spewing forth its contents'.

'At the instant of its origin, all matter and all forces were indistinguishable from each other. As the Universe expanded and cooled, matter and forces split again. Still in the billionth of a second in its history, the Universe continued to fragment. Soon all the constituents of matter- what we now call quarks and leptons, assumed separate identities, falling into separate classes that have been joined again. The single force propelling the cataclysm also became fragmented and the different particles became associated for ever with the new forces that were being created. Three of

the fragmented force are still at work inside an atom. The most powerful of these in the strong force that binds the constituents of the nucleus together – the quarks that make up the protons and the neutrons. One thousand times weaker is the electromagnetic force that keeps the electrons, a type of leptons, orbiting around the nucleus. This force makes atoms appear solid and also is responsible for radio and light waves. . . . In this scenario at first there was nothing, no time, no space, a void beyond void, there was no **now, then and will be**; present, past and future; no here, no there. The infinitesimal cosmos began to expand and as it grew it cooled and its energy dissipated; flying particles began to coalesce into atoms, in the course of billions of years, stars, galaxies, others including solar system, earth, life, animals and humans'. It needs to be understood that dissipation of energy leads to disorder. There is thus in the expansion of the Universe an in-built state of disorder from order in a broader sense.

The Big Bang postulate attempts to offer plausible explanation for many an observed phenomenon, but it is not a clinching evidence. Nor does it throw light on as to why that presumed explosion took place. More importantly, it is woefully silent on how and when inanimate matter became animate or how life originated. It may, however, be noted that the constituents of all animate matter from amoeba to humans are made of the same elements as witnessed in inanimate matter. Biologists continue to think of the animate matter in terms of the same physical forces that operate in inanimate matter, unlike in the past when speculative concepts such as vitalism were regarded as of fundamental importance.

An interestingly emergent idea is that the structurally seminal features of the Universe are governed by certain constants and forces. Significantly, these constants and forces have been considered to be the pre-requisites for the emergence of life. It has been pointed out that if they were even slightly different from what they have been, it would have been well nigh impossible for life to emerge and gradually evolve into a complex, biological phenomenon like mankind. According to Stephen Hawking: 'a Universe like ours with galaxies and stars is actually unlikely, and if one considers the possible constants and laws that could have emerged, the odds **against** a Universe that has produced life like ours are immense.' (Boslough, 1, 1989, pp. 101-102)

There is another aspect of the postulate regarding the Universe, whether Big Bang, inflationary or otherwise. Any change in the Universe

does lead to a more disorderly situation, the entropy increase being determined by the Second Law of Thermodynamics. There is a dilemma here, how in defiance of the Second Law of Thermodynamics, the Universe got into its original ordered, undifferentiated point? Is our Universe to start with an accidental reversal of entropy or disorder? or is it a case of order out of chaos? In any case, the entropy of the Universe is on the increase.

Be that as it may, an intriguing point is the 'Anthropic Principle' as pointed out by Brandon Carter, or the statement of Stephen Hawking, namely, **'things are as they are because we are . . . and if the Universe was otherwise, there would be no body to ask the question'** (p.102). It is true that such statements are not fully accepted by scientists and theologians alike. Yet, they need to be addressed from the standpoint of an important three-in-one relationship, namely, (i) the relationship between the Universe, (ii) the Solar system including the Earth as an integral component of it, and (iii) the very life and living systems culminating in Man. In other words, the consonance of Macrocosm and Microcosm looms large even from a scientific angle. It is, therefore, naïve to think that Man as well as other forms of Life and the Universe are disparate; equally naïve it is to think that what happens in the vast expanse will have no bearing whatsoever on the humans and other living systems on this planet. The **whole** determines the part, and the part **integrates** itself into the whole. The ancient concept that microcosm is a recapitulation of the macrocosm appears to have now found now some sort of acceptability. For, scientists point out that if the physical laws and constants were even slightly at variance from what they are now, the evolution of life would have been an impossibility. In other words, our Universe is 'fine-tuned' as it were for the emergence and interplay of life in diverse forms, eventually into *home-sapiens*. Moreover, our universe is conceived to be observer-dependent—an intimate concordance of life and the vast expanse. There is even an extreme view that a Universe without an *observer* is no Universe at all.

There are currently two divergent views: one, pessimistic and the other, optimistic. On the basis of what are designated as scientific paradigms; one, an unavoidable doom is envisaged, i.e., the eventual disintegration of the Universe that could occur after a very, very long time; the other view has been expressed by thinkers like Freeman Dyson that after all Life might very well succeed against all the odds in shaping the Universe to suit its own purpose. The design of the inanimate Universe might not be as detached or

indifferent from the potentialities of life and intelligence, as scientists of the twentieth century have tended to suppose.

It may be true that order, symmetry and simplicity in some respects characterize the building blocks of different forms of life—molecules, cells and the like. But to think of human being as merely gene machine or in terms of billions of cells, neurons and several chemical constituents is like the proverbial blind men trying to figure out an elephant.

Avaricious 'outer' man

Life or living systems are not exactly in the nature of closed systems. They have an openness and freedom of their own especially human beings and societies. In a broader sense, entropy-related issues take on a new dimension in respect of man and human societies. Though a living organism endeavours to transform as much as possible of its environmental energy into itself, man seems to surpass all other living beings in this respect. A greedy energy scavenger that he has been, he garners more energy and carelessly dissipates it in such a way that a considerable part of it becomes practically unavailable for future use. Thus he contributes to a greater disorder to the environment; also he chooses to maintain his own selfish physical balance at the expense of the ensuing disorder in his environment. In his ambition to be undisputed master of the biosphere, he has been instrumental for the extinction of some species and disagreeable destruction of the environment.

The energy-flow at the individual and societal levels has been of such magnitude that today it has assumed alarming proportions. This has been creating greater and greater disorder or imbalance to the detriment of the much needed symbiotic relationship between man and his environment. Man appears to be moving now with great speed at the peak of what may be called a high-entropy culture. Constantly engaged in augmenting his material wealth and greedily involved in his sensorial satisfactions, man, wittingly or unwittingly, has been squandering the natural energy-resources. The material man, or the sensorial avaricious 'outer' man is today more in evidence than the 'inner' man embodying human values and goals. It is strange but true that a biologically systemic living entity like man has become in several ways more harmful to the environment than the other

types of living species. Though endowed with intellect and its immense capabilities, man has chosen to be a maker of his own degradation, eventually leading to a none-too-happy scenario of his future.

Human mind is capable of being circumscribed as well as becoming transcendent; circumscribed by the vicarious play of senses; transcendent beyond the senses into a realm of undifferentiated and inexpressible joy of oneness. The circumscribed mind with its total disregard for his environment, societal and otherwise, is lured away by the material desires engendered by the instinctively governed senses. Excessive material consumption and possessions beyond one's needs result in the dissipation of energy which otherwise could be utilized in a manner beneficial to the society at large through the enrichment of the environment. In short if an individual contributes more to the environment than what he takes away from it, he will leave behind an ambience more fertile than what it was before he became an integral part of it.

Low-entropy living

Such an approach becomes seminal to low-entropy culture – a culture where the individual –society relationship would be in the nature of an ethically inspired, dynamic living among the human beings themselves. At a macro-level, the relationship of man with nature would be one of harmony, or in other words, man and nature become inseparable entities. For this purpose, there needs to be constant endeavour to view with disdain and to discard the present day concepts and practices such as '*exploiting nature for material living* or '*taming the nature*' with a view to establishing the supremacy of man over nature.

Man in harmony with nature means a low-entropy economy. Not only does it recognize the physical limitations of natural resources, but also necessitates their optimized utilization for the benefit of humans as well as the other forms of life. Its matrix is one of satisfying minimum needs or desires to maintain life at certain standard. Such a type of low-entropy living would be more beneficial if human-based technology is adopted more and more in preference to machine-based sophisticated technology. Low-entropy living arrests the undesirable transition, as far as possible, of the usable form of natural energy into the non-usable forms. It also leads to the development of certain strategies for using renewable energy sources.

It needs no emphasis that low-entropy living to be meaningful or successful, demands a cultivated mind-set not only at individual but even more so at the community level – a mind-set fortified by a determination or will power of controlling such desires as tantamount to avarice. It is a mind-set that fosters a holistic vision or spirituality, that transcends the insatiable material cravings which afflict man in his day-to-day existence. In other words, the inner spirit needs to be diligently aroused and it should subsume the outer temptations. As a result, the inner spiritual quest leads to an exalted and ennobling experience. It cements man with fellowmen without any type of distinction or differentiation. But the path is by no means easy. It is a continuous process of tuning the mind from the material world to a spiritual experience.

In this respect, an important form of Indian traditional knowledge and practice, called Yoga, that has been proving its validity even in the modern context merits attention:

Yoga: Spirituality

Yoga has found adherents not only in all segments of Indian society but also has become widely popular outside India as well. Yoga, literally means "to yoke", "to unite", or 'the union itself'. It comprises systematic or well orchestrated psycho-physiological exercises as well as a conscious control of instinctual yearnings. Ultimately it aims at the elevation of the human mind, and surrendering to a higher being; towards the attainment of Oneness and away from the agonizing state of unreal plurality. It leads to a reordering of one's equation with the external world. The doctrine and practice of Yoga comprise eight 'limbs'.

Self-restraint or abstinence; (*yama*);

Observances in practice (*niyama*);

Physical or bodily postures (*'sana*);

Technique of rhythmic breathing or breath control (*pr^oiy^oma*); temporary cessation of breath in inspiration, expiration or between inspiration and expiration.

Withdrawal of senses (*praty'h'ra*);

Concentration of mind on a limited object, image or word (*dh'ra'a*);

Prolongation of this technique and contemplation without interruption (*dhy'na*); and

Pure, undifferentiated awareness (*sam'dhi*) and the disappearance of the notion of 'I' or the ego – Trance.

Of the foregoing eight 'limbs' as enunciated in the *YogasŪtra-s* of Patañjali, the first two are essentially ethical in content, namely, abstention from violence and falsehood, non-acquisition, contentment, austerity and self-surrender to a higher Will. The third is tuning the body. The fourth is rhythmic breathing or breath control, an important aspect of *Yoga*, catalyses the synergy of body and mind. The fifth is the full control of the play of senses; all of these are psycho-physical. The sixth, seventh and the eighth are the three meditative states to be attained progressively with deep concentration. Through these, a dedicated practitioner would be able to discard or extinguish the activities (*citavātti*) of the mind such as emotional stress, anxieties, direct sensorial activities and perturbations, illusory content of our consciousness, horrid memory traces and the like.

Yoga thus is a pathway to mind-body concord and even beyond into Liberation. It is a spiritual discipline which everyone could adopt with determination. Yoga perhaps may not pass the rigorous scientific tests of verifiability and reproducibility. However, it is important to note that a large number of Yogic practitioners all over the world testify to its efficacy and the positive effect of controlled breathing on mental concentration, as well as the benefit of meditation for the equanimity of human mind. Yogic pursuits can serve as a method for personality reconstruction with controlled desires. According to a recent review that appeared in New York's *Wall Street Journal*, (*Times of India*, 16 October 2003) roughly 15 million US adults, now practise Yoga and aver that Yoga sets right various types of disorders, helps relieve tension of sorts and frees from the cobweb of material life that ensnares man and distracts him from spiritual quest. The tradition of Yoga has a wide base in India and its soothing role in the stressful modern milieu is well recognized. It is significant that a large number of Yogic centres with some variations in practices, have sprung up in different parts of India and abroad.

Consciousness and Spirituality

Deep meditation with yogic approach elevates the level of consciousness—a vital entity of which we know very little at present, but which we all experience. A physical description of the brain that it is composed of several billion nerve cells or neurons, each connected to many others through axons, dendrites and the like, appears to be a string of words, woefully inadequate to shed light on the core issue of human consciousness. They fail to explain not only the nature and structure of the relationship between the brain and the mind, but also the all-encompassing, consciousness. The theoretical stance in terms of the neural correlate of consciousness is still in its infancy. There has been no concrete model of how even a plausible theory of consciousness would look like. One cannot but agree with the conclusion of John Searle: that consciousness is still a mysterious entity and the current theories are a total failure because they do not address squarely the fundamental question of how the brain produces consciousness. Another basic question is why should there be consciousness at all or what are its measurable dimensions in humans? Chalmers has exclaimed that the biggest mystery is consciousness and it is the largest outstanding obstacle in our quest for scientific understanding of the Universe. There are other enigmatic questions too: could consciousness be a fundamental property of the Universe? Is it prior to matter? These have remained as questions, perhaps continue to remain so far a long time to come. An associated puzzle is what is the nature of the self or the notion of 'I' that is after all the subject of consciousness. Is the 'I' centric Universe the same as the cosmologically necessitated anthropic view? In any case, some philosophers have treated the two-in-one i.e., the **self** and the **universe**, as being at the heart of the phenomenology of consciousness. In the ultimate analysis consciousness is essentially a subjective phenomenon or experience, and our usual methods of the so-called objective scientific inquiry can at best provide only a partial solution to this enigmatic problem.

It is refreshing to note that neuro-scientists, despite the apparently intractable and still unexplainable entity, namely, consciousness, admit the importance of Eastern mediation traditions for exploring the depths of consciousness. The significance of such meditation traditions lies not in unravelling the mystery of consciousness but in elevating the human experience to such an extent that there comes about an inexplicable merger

of what is termed as the Self with the Universal Self, the highest form of spirituality. While the highest merger is a goal ever in sight, the path or the pursuit of spirituality towards it obliterates the differences of all kinds. There springs forth an inner energetic glow- a glow that devours all darkness of selfish desires and dehumanisation. The material world appears as nothing but an illusion or a temporary play ground.

Spirituality engenders the humanistic goals of an individual as well as of the society at large. Spiritual pursuit mends social disorders and leads towards order. Human life in general takes on an enlightening dimension, and develops just and need-based relation with nature. Spirituality is to be experienced. To experience means the internalisation of the inexhaustible usage, like *Tao*:

'When one looks at it, one cannot see it;

when one listens to it, one cannot hear it;

However, when one uses it, it is inexhaustible' (Tao Te Ching, XXXV)

The twentieth century has witnessed undoubtedly the peak of human intellect in science and technology. Alongside it has also been a harbinger of social tensions, diverse disorders and anti-human conflicts. Behind this scenario lies what may be called human entropy— an entropy not physical but largely mental. In essence it is an ever expanding and disorder-generating 'ego' or selfishness – individual, communal and national. This has erected dangerous barriers between man and fellow-man. A person trained in the method of science is supposed to be an embodiment of the paradigmatic objectivity and rationality. Ironical indeed that in human affairs, between him and his fellow humans, he is by and large an impulsively charged ensemble of ego not unoften with detestable inhuman or even bestial actions. The blinding curtain of ego needs to be uncovered and this is possible only through spirituality. For, spiritual pursuit refines the raw instinctive manifestations into an elevated mind-set. Such a mind-set would conquer ego in a way that the individual and through him the society or nation at large, sees and feels the fellow-man regardless of religion or region, in the same manner as he sees and feels himself.

There is now a great need to transcend selfishness or ego of all sorts through spirituality. This alone enables one to imbibe values of life like human compassion, non-violence and non-possession, displacing the inner

enemies of man, namely, greed, hatred and jealousy. There is no denying that self-refinement results in an inner light that illumines both the 'inner' and 'outer man'; a new-awakening that relegates the hedonistic practices and desires. Today consumerism is at its pinnacle; commodification of life itself is galloping; resources are depleting; energy is being dissipated.

Human intellect is capable of overcoming obstacles. There may perhaps emerge new ways to tap effectively the renewable energy sources, new types of energy conduits and new ways of manipulation of living energetic sources. Bio engineering or new genetics techniques may be developed for augmenting the energy-flow from the environment to the life system. But it needs to be borne in mind that minimising human disorders is as important as the adoption of remedial measures for the maintenance of energy balances and ecological concerns. In other words, Man has to regard himself as an integral component of humanity and nature; he needs to elevate his mind into spirituality and at the same time lower his energy-based desires. The mind-set of individuals will be that of the larger society itself. Spiritually disciplined mind knows no chaos, nor introduces disorders. Humanity is now seeking a vital order for its own survival – an order that derives its sustenance from spirituality and austere living patterns. A determined pursuance of spirituality and low-entropy culture, therefore, has all the merits of a synergic pathway towards a humanised living in the twenty-first century. In this pathway, greed is discarded, need is fostered; Ego is set aside; enlightened self is engendered; Hatred is shed; Universal love is nourished.

References:

Adams, Richard N: *Energy and Structure*, University of Texas, Austin, 1975.

Benoit, Emile: 'The Coming Age of Shortages', *Bulletin of the Atomic Scientists*, March, 1978.

Boslough, John: (1) *Stephen Hawking's Universe*, Fontana/Calvins, 2nd impression, Glasgow, 1989; (2) *Masters of Time*, Phoenix-Orion Books, London, 1992.

Blun, Harold, F: *Time's Arrow and Evolution*, Princeton University Press, New York, 1968.

- Brooks, Adams: *The Law of Civilisation and Decay*, Freeport, New York, 1971.
- Chalmers, David J.: *The Conscious Mind in Search of Fundamental Theory*, Oxford University Press, New York, 1996.
- Clark, Wilson: *Energy for Survival*, Doubleday, New York, 1975.
- Davies, Paul: *The Runaway Universe*, Harper & Row, New York, 1978.
- Delsemme, Armand: *Our Cosmic Origins*, Cambridge University Press, Cambridge, Reprint, 2000.
- Deussen, P. J.: *The System of Vedanta*, (tr. A.S. Geden), Chicago, 1912.
- Douglas, Jack D.(ed): *The Technological Threat*, Prentice-Hall, N. J. 1971.
- Dyson, F.: 'Energy in the Universe', *Scientific American*, 225, 1971, pp. 50-59.
- England, Richard and Bluestone, Barry: 'Ecology and Social Conflict' in *Toward a Steady State Economy*, (Ed) Herman E. Daly, Freeman, Sans Francisco, 1973.
- Georgescu-Roegen, Nicholas: *The Entropy Law and the Economic Process*, Harward University Press, Mss, Cambridge, 1971.
- Gough, A.E.: *The Philosophy of Upanisads and Ancient Indian Metaphysics*, Trubner & Co, London, 1882.
- Hawking, Stephen: *A Brief History of Time*, Bantom Press, London, 1997.
- Hawking, Stephen and Penrose, Roger: *The Nature of Space and Time*, Princeton University Press, New Jersey, 1996.
- Heilbroner, L. R: *An Inquiry into the Human Prospect*, Norton, New York, 1974.
- Jasper H. H. et al. (eds): *Consciousness: At the frontiers of neuroscience; Advances in neurology*, Lippincot, Raven, Philadelphia, 1993.
- Kenneth, Boulding: 'The Entropy Trap' in *The Meaning of the Twentieth Century*, Harper & Row, New York, 1965.
- Kubat, L. and Zeman, J.: *Entropy and Information in Science and Philosophy*, Elsevier, Amstendam, 1975.
- Meadows, D. et al: *The Limits to Growth*, Universe Book, New York, 1972.
- Mowbray, A.Q: *Road to Ruin*, Lippincot, Philadelphia, 1969.
- Penrose, Roger: *Shadows of the Mind*, Oxford University Press, New York, 1994.
- Prigogene, Ilya and Stengers, Isabelle: *Order out of Chaos*, Fontana, Glasgow, 1984.
- Rifkin, Jeremy and Howard Ted: *Entropy: A New World View*, Bantam, New York, 1981.

- Rozak, Theodore: *Where the Wasteland Ends*, Doubleday, New York, 1972.
- Scharga, Peter: *Mind Control*, Pantheon, New York, 1978.
- Schumaker, E.F.: *Good Work*, Harper Row, New York, 1979; *Small is Beautiful*, Perennia, New York, 1973.
- Searle, J.: *The Mystery of Consciousness*, New York Review Books, 1997; *The Rediscovery of the Mind*, MIT, Cambridge, 1992.
- Thomas, William, L: *Man's Role in Changing the Face of the Earth*, University of Chicago Press, 1956.
- Taimini, I. K.: *The Science of Yoga*, The Theosophical Publishing House, Madras, 1971.
- Wade, Nicholas: 'Entropy, the Measure of Economic Man', *Science*, October 31, 1975.
- Weinberg, Steven: *First Three Minutes*, Bantom, New York, 1979.
- White, Leslie A.: 'Tools, Techniques and Energy' in *Culture and Social Anthropology*, (Ed) Hammond, P., Macmillan, New York, 1964.