

Ethnobiological Studies from *Manusmruti*: XIII Environmental Factors and Views on Origin of Life as Perceived Then and Now

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INTRODUCTION

The cremation of corpses as per Hindu religion, realization of the facts as reflected in the funeral rituals such as lighting a *Deepa* (candle) or placing a *Poornakumbha* (earthen pot filled with water hanged over a Banana plant – *Musa sapientum*) as a token of the departed soul and finally immersion of the *Chitaabhasma* (funeral ashes) in the water (of Ganga or any river or sea), signify the highest eco-consciousness amongst the ancient Indians, the way they have formulated the ritual. The philosophy lies within such activities is, the intangible components of the physical body returns (disintegrated) to the surrounding ecosystem: the fire, the earth, the water and the plant system from which it is created, certainly focuses on their applied ecological knowledge, conceived as the biogeochemical cycles, unlike a system of burying the dead body. In our continuous search for aspects of human ecology in the vedic age compendium *Manusmruti* (Dash, 1998, Padhy, 2000; Mohapatra et al., 2001 a-d), this paper is devoted to explore the ancient knowledge of ecological factors and origin of life as depicted in the epic.

Mahaabhootas (The Ecological Factors)

Ancient Indians are the pioneers for the comprehension and scientific perception of ecological factors, known as *Mahaabhootas* (great elements), which are of five forms such as: (1) *Aakaassa* (Ether), (2) *Vaayu* (Air), (3) *Tejas* (Fire), (4) *Aapa* (Water) and (5) *Kshiti* (Earth), differentiated out of the *Prakruti* (Primal Nature or Cosmic Substance). The facts about the *Mahaabhootas* are depicted in *Sslokas* (Sl) 20, 75-78 / *Adhdhaaya* (Ad)-I of *Manusmruti*. The critical analysis reveals that each of the above *Mahaabhoota* is conditioned and evolved from the one, immediately placed in order of proceeding as: Ether, Air, Fire, Water and Earth and each has its own speciality in addition to the general

qualities of the others from which it is evolved (Fig. 1). This development is in the order of increasing tangibility among the *Bhootas*. In fact, all manifestations in the phenomenal world, which are recognized as ecological factors in modern science such as (1) Climatic, (2) Physiographic, (3) Edaphic and (4) Biotic factors are the different modifications of the *Mahaabhootas* and nothing new. But Ether, the principle of vacuity, the prime among the *Mahaabhootas*, is not emphasized as an ecological factors in modern science, even though space and time are two great concepts in Einstein's theory of relativity (Capra, 1975). Further, the evolution is mentioned as follows.

*Anvyo maatraa binaassinyo
dassaarddhaanaam tu yaah smrutaah,
Taabbih saarddhamidam sarbam
sambhabatyanupoorbassah. (27/I)*

Meaning: But with the minute perishable particle of the five (elements) which have been mentioned, this whole (world) is framed in due order (Buhler, 1886).

Ecology from mythological point of view, in Hindu cult a special ritual is performed with chanting of *Mantras* for cleansing the environment before the onset of any *Poojaa* or *Jajnya* (Sacrifice) known as *Bhootassuddhi* (Purification of elements). The validity of a ritual is questionable without the *Bhootassuddhi*, certainly speaks of the awareness of eco-consciousness performed through *Maantrik* vibrations. In a different view as per Yoga Philosophy, the *Mahaabhootas* are recognized to have deep seated placements at subtle level in a human body at the central nervous system (CNS) passing through the spinal column at specific nerve centers known as *Chakra* or *Padma*. Six such *Chakras* are: (1) *Mulaadhaara* (placed at pelvic plexus and coccygeum ganglion – carry the phenomenon of earth: *Kshiti tattva* – The point of waste excretion that enters the soil / colon system), (2) *Swaadhishthaana* (Hypogastric or

ORDER OF EVOLUTION ↓	GREAT ELEMENTS (<i>Mahaabhootas</i>) →	PROPERTY MANIFESTATIONS (<i>Tanmaatras</i>)				
		Have(s)	Have Not(s)			
	ETHER (<i>Aakaash</i>)	Sound (<i>Ssabda</i>)	Touch (<i>Sparssa</i>)	Form (<i>Roopa</i>)	Flavour (<i>Rasa</i>)	Odour (<i>Gandha</i>)
	AIR (<i>Vaayu</i>)	Sound	Touch	Form	Flavour	Odour
	FIRE (<i>Tejas</i>)	Sound	Touch	Form	Flavour	Odour
	WATER (<i>Aapas</i>)	Sound	Touch	Form	Flavour	Odour
	EARTH (<i>Kshiti</i>)	Sound	Touch	Form	Flavour	Odour

Fig. 1. The order of evolution (increasing tangibility) of the *Mahaabhootas* (Ecological Factors) as presented in *Manusmruti*

Abdominal aortic plexus – Phenomenon of water; *Aapa tattva* – The point of water excretion / Renal system), (3) *Manipura* (Solar Plexus – Phenomenon of fire: *Tejas tattva* – The point of oxidation / digestive system), (4) *Anaahata* (cardiac plexus – phenomenon of Air: *Vaayu tattva* – The point of oxygen acceptance / Respiratory system) (5) *Bissuddha* (Cervical or carotid plexus – Phenomenon of vacuity: *Aakaassa tattva* – The point of sound vibration / vocal system) and (6) *Aajnyaan* (Cavernous plexus – Phenomenon of unlimited energy: *Surya tattva* – the point of thought vibration / The mind). So the *Chakras* are conceived as the relational manifestation of the *Mahaabhootas*, control the total activity of the human body (Sanyal, 1960).

The hydrological cycle of the nature is the basic link among the different biogeochemical cycles as per modern science, also in other way establishes relation between the *Mahaabhootas* in a wider sense. The facts about the development of nature's water (Hydrological) cycle as depicted in *Manusmruti* is as follows:

Later in course of time the atmosphere (*Dibam*) and earth (*Bhoomim*) have been created (*Nirmaana*); and the nature's eternal abode of Water (*Ssaasswatam* – pure water / cloud and rain) appeared in the middle sphere of the sky (*Madhya Vyomo*) (*Vide* Sl. 13/Ad.I).

Origin of Life

Both *Manusmruti* and modern science commonly converge to express that "Life" was first created in water.

Sobhidhdaaya ssareeraat swaat sisrukshuh bibidhaah prajaah,

Aapa eba sasarjaadou taasu beejam abaasrujat (8/1).

Meaning: He, desiring to produce beings of many kinds from his body, first with a thought created the water and placed his seed (*Beeja*: the power of creation) in it (Buhler, 1886).

It is only in 1936, the book 'The origin of life' by A.I. Oparin, the Russian Biochemist, opened a new chapter to supplement thoughts on the scientific aspects of creation of life.

Millions of years back the earth's atmosphere was in a highly reduced state filled with gases like Ammonia (NH_3), carbon monoxide (CO), Methane (CH_4) etc. By the interaction of these gases with physical forces like electrical discharge and U.V. irradiation etc. simple molecules could be constituted and aggregated to form more complex ones. No one knows how the life is created; but the reaction of these organic compounds with one another has given rise to a system that could reproduce. Probably the major structural organic molecules that constitutes the contemporary cell, were created abiologically before the life started (Sagan, 1971).

To prove the above chemical evolution theory, many experiments were conducted in different laboratories throughout the world to find out the chances of association of different atoms in the then expected atmospheric conditions on earth, 3000 million years back. Pioneers in this work are Stanley Miller, Sidney W. Fox and Malvin Calvin, who proved that biological molecules like amino acids, peptides, purines, pyrimidines and other organic compounds could arise spontaneously under different expected (hypothetical) environmental conditions in the earth's primitive state, designed in the laboratories (Wald, 1954; Anonymous, 1971).

In course of time following the advent of chemical evolution, the macromolecules like proteinoids and precursor nucleic acids joined together (Virus like) to form a prototype of modern living cell, further evolved to prokaryotic anaerobes which could survive in extremely reduced condition, present during the pre-cellular period. The photosynthetic process was evolved approximately two billion years ago, along with the changes of earth's atmosphere and consequently photosynthetic bacteria (non-oxygen evolving) and ultimately cyanobacteria (oxygen evolving) was formed. The prokaryotic system transformed to a eukaryotic cell which has picked up the process of evolution to form a complex life form. The entire scenario had taken millions of years to come up and expanded to the form of multifarious biodiversity as existing to-day (Anonymous, 1971).

The views on origin of life in *Manusmruti* are depicted in Sl. 14-19 / Ad. I. The systematic creation of life (*Sareera* – The body) evolution

of perishable form from the imperishable has occurred due to the combination of great elements (*Mahaabhootas*), grossly similar to modern theory on aggregation of molecules and chemical evolution. In addition to the idea of explaining the life on chemical and physical basis, the *Smruti* says that the process of living is possible due to addition of Six metaphysical phenomena known as *Tattvas* with the *Mahaabhootas*. This theory is expanded as *Saamkhya* philosophy by Kapila, a renowned sage. *Saamkhya* enumerates the principles of cosmic evolution by rational analysis. Its expositions are no more metaphysical speculations, but are purely logical account based on the scientific principles of conservation, transformation and dissipation of energy (Bernard, 1989). Even modern day scientists have opined that biology should not always dragged to be explained through the principles of physical science and the expression for the phenomenon of life demands the formulation of new laws (Wald, 1954).

The theories of Origin of life in *Manusmruti* explained through *Saamkhya* philosophy, postulates two ultimate realities, *Purusha* (Spirit) and *Prakruti* (Matter), which serve as the source out of which all things evolved. They exist as logical principles, as the creation is impossible without any pre-existence, for something cannot come out of nothing.

The *Purusha* means the "Soul of the Universe", the animating principle of nature, the source of consciousness, the subjective aspects of nature. It is the universal spirit, eternal, indestructible, all pervasive and the ultimate principle of intelligence, that regulates, guides and directs the process of cosmic evolution. It is the background that gives us the feeling of persistence, the silent witness of nature. *Purusha* is neither produced nor produces.

The second principle called *Prakruti* (*Pra*: the first + *Kruti* : to produce) is also not produced (like *Purusha*) but produces. It existed before anything was produced, the primary source of all things. It is the original substance out of which all things have come and into which all things will finally return. It is the primal nature or the cosmic substance. The *Prakruti* consists of three essential constituents called *Gunas* (Quality), named *Sattva*, *Rajas* and *Tamas*. A

detailed account of *Gunās* was reported earlier (Dash and Padhy, 1998b). In short: *Sattva guna* connotes the power of the nature that illuminates and reveals all manifestations, *Raujas guna* is the activating and exciting potency without which the other constituent cannot manifest and *Taamas guna* is the restraining and binding potency of nature. In the process of cosmic evolution the *gunas* never separate, they co-exist in everything; never function separately, rather support one another and intermingled with one another, but one or the other may predominate. The variegated arrangement of *gunas* accounts for all the diversified manifestations of nature.

When the homeostatic balance of *Prakruti* was first disturbed (When; How and Why ???) the *gunas* interacted for manifestation giving rise the first product of the cosmic substance known as *Mahattattva* (cosmic intelligence). The cosmic intelligence should be perceived as the capacity to expand, reveal and assertion to fulfill the ultimate destiny of nature. It is the birth of intelligence can be explained scientifically as a stage, when the previously undifferentiated energy takes a definite direction for defined line of evolution.

Mahattattva was followed by the next principle *Ahamkaara* i.e. the individuating principle. It is the state of self-realization, self consciousness or self identification which is a necessary condition before the onset of any action. The next principle evolved, is known as *Maanas*, the principle of cognition or cosmic mind. It is a state when the individuating principle 'I' realizes its existence i.e. "I am this" (universe / atom / cell / Padhy / Dash Mohapatra and so on). The cosmic mind (*Maanas*) expressed its inherent capacity to cognise and act through the *Indriyas* (the power / force / capacity of distinct perceptions). The *Indriyas* are divided into two groups (A&B) each of five types as:

To make the *Indriyas* functional six subtle elements are evolved known as (1) *Ssabda* (essence of sound), (2) *Sparssa* (essence of touch),

(3) *Roopa* (form), (4) *Rasa* (flavour) and (5) *Gandha* (odour). These are called as *Tanmaatraas* (the sense – powers), the first conceivable division of matter which are perceived mediately only through particular objects. The five *Mahaabhootas* described earlier (Ether, Air, Fire, Water and Earth) are the sense-particulars act as vehicles through which the *Tanmaatraas* (subtle elements) manifest themselves. Probably this is the point of association between the physical world and meta-physical evolution.

The existence of *Tattvas* is an universal phenomenon applicable to both abiological and biological system. The explanations for the creation of life through *Saamkhya* needs a special view to look into it with blending of biology and philosophy. Even the minute possible organism, the bacterium is not free from aspects like intelligence, egoism, power of cognition and capacity for perception of subtle elements. In the whole biodiversity these phenomena exist in different forms with different intensities in different organism may be completely suppressed in one case or extraordinarily expressed in another organisms, with diversified manifestations and evolution. The specialized and unique sense power in different life forms such as: sound perception by Bats (*Pteropus* sp.), touch sensitivity of Laju lata / (*Mimosa pudica*), special vision of Owl (*Athene brama*, *Bubo* sp.) in night, distinct vision of Hawk (*Falco pergrinator*), tasting capability of ants (Termites – a specialized group of insects) and smell recognition of dogs (*Canis familiaris*) are the few examples. The totality in balanced form is only/or may be seen in man, the Supreme Being of creation. The human system too is not free from the variegation of sense perception.

Above all, in *Manusmruti* the creation of life is finally attributed to the divinity, may be further evolution is biological following the principle of the nature as evident from the following narration.

Abstract Knowing Organs (A)
Jnyaanendriys

1. *Srotra* (power to hear)
2. *Twak* (Power to feel)
3. *Chakshu* (Power to see)
4. *Rasana* (Power to taste)
5. *Ghraana* (Power to smell)

Abstract Working Organs (B)
Karmendriyas

1. *Baak* (Power to express)
 2. *Upastha* (Power to procreate)
 3. *Paayu* (Power to excrete)
 4. *Paani* (Power to grasp)
 5. *Paada* (Power to move)
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"But joining the minute particles even of those six which possesses measureless power with particles of Himself, He created all beings" (Sl. 16/Ad.I). 'He' refers to *Purusha*, the spirit, soul, source of consciousness, eternal, indestructible, the ultimate principle which is neither produced nor produces – The *Paramaatmaa* – The soul of the universe.

Further 56/I, says "When, being clothed with minute particles (only), it enters into vegetable or animal seed, it then assumed, united (with the fine body), a (new) corporeal frame".

The two schools of thought on origin of life, one being ancient based on logical and metaphysical perception and the other recent, scientific, based on experimental results, diverse from each other in space and time, certainly need a comparison from a closer angle (Fig. 2).

Life Process: Mythological Perception

Life originated in water as proposed earlier (Sl. 8/Ad.I) is further supplemented in Sl. 10/Ad.I, as follows:

Aapo naaraa iti proktaa aapo bai narasoonabah,

Taa yadasyaayanam poorbam tena naaraayanam smrutah (10/I).

Meaning: The water(s) is (are) called *Naaraah*, (for) the water, indeed, the off-springs of *Nara* (the other name of the supreme soul and water originated from Him (Sl. 8/Ad.I); as they were (water) his residence (*Aayana*), He (the Supreme Soul) hence is named, *Naaraayana*.

The above narration can be explained scientifically: the representative life procreates, *Naaraayana* first appeared (took his residence – abode) in water. This fact as reflected in common mythological pictures, *Naaraayana* is found in *Anantassayana* (endless sleep) posture in the cosmic ocean (Vitasaxis, 1977). In this context, analysis of mythological pictures is essential (Bahsam, 1977) to explore the hidden scientific theme in them (Padhy et al., 1999, 2001).

In an eye catching icon (Fig. 3) *Naaraayana* as an innocent kid, is sucking his own toe, resting upon a Banyan (*Ficus benghalensis*) leaf in the midst of the cosmic ocean at the time of dissolution. This expression is symbolic as the floating of a baby on a leaf seems impossible, rather

suggesting the autotrophic nature of plant system as self synthesizing and self eating (Padhy et al., 1996). One step ahead, a little modification of the Icon makes it more meaningful from scientific point of view, as the autotrophic system fetches carbondioxide from atmosphere (left hand extended), sucks (drinks) water through root system (or foot, plants are known as *Paadapa*: drink water through foot – left foot touches the water), light energy being the cosmic source (God Thyself), the leaf (Chlorophyll) is the platform for the transformation of solar energy to biochemical form (CH_2O)_n and the food is used for sustenance and maintenance of life (sucking his own toe-self eating).

Expansion and Ramification of the Nature

Manusmruti believes in the beginning of time (and time divisions) with the starting of creation and further expansions of the physical world such as: the formation of planets, lunar mansions, lightening, thunder bolts and clouds, imperfect and perfect rainbows, falling of meteors and super natural noises, comets, heavenly bodies of many kinds followed by formation of rivers, the oceans, the mountains, plains and uneven ground have occurred in course of time (Sl. 24, 38/Ad.I). The occurrence of such environmental animates perpetuating ever since, which were more during the pre-biotic period. The change on the earth surface due to periodic glaciation, emergence of mountains, submergence of lands etc., were evident during those period.

Changes in physical environment was associated with the appearance of living forms broadly ascribed as *Chara* (movable – animal world) and *Achara* (immovable-plant kingdom) (Padhy et al., 1997) with examples of bio-diversity such as men, monkeys, carnivorous beasts, domesticated animals, free living herbivores, birds, fishes, small and large worms, beetles, moths, lice, bugs, all stinging and biting insects and the plant world (Sl. 37, 39, 40, 41/Ad.I). The biological classification as proposed by *Manu* (Dash and Padhy, 1997), principles of Genetics (Dash and Padhy, 1998) and ethics for conservation of biodiversity (Dash and Padhy, 1998) has been reported earlier. In addition to biological and abiological changes in nature the evolution of other basic psychological characters like:

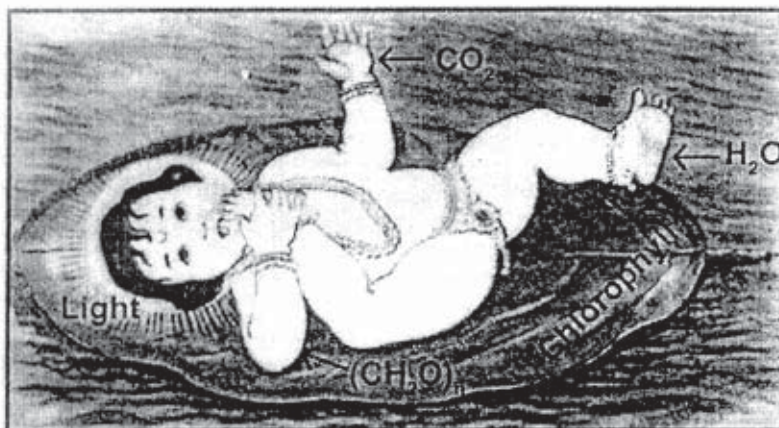


Fig. 3. Primeval cosmic man: *Bhagawan Naaraayana*, as an innocent child resting upon a Banyan leaf, representing the Autotrophic system (Photo by Geeta Press, Gorakhpur, Modified by authors)

Tapam (Austerity – power of concentrations); *Baacham* (speech – for communication); *Ratim* (sex – for pleasure); *Kaama* (desire – Power to acquire) and *Krodha* (anger – to show reaction/retaliation) are expanded as secondary manifestations for the maintenance of the creation (Sl. 25/Ad.I). Such characters are not to be attributed to human beings only, rather possessed by all animates too.

The whole process of creation and evolution is explained in accordance with the *Veda* (Sl. 21/Ad.I).

But in the beginning he assigned their several names, action and condition to all (created beings) even according to the words of the *Veda* (meaning of 21/I; Buhler 1886).

Veda is regarded as the final authority of knowledge and the prime philosophical insight (Das, 1960; Bernard, 1989), which means that the developments have occurred systematically in the order of the nature's law, nothing at random. Incidentally 'name' signifies identity of an organism, 'actions' specify its working principle and 'condition' reflect on its ecological position, which are the three important underlined components of 'Ecological Niche'.

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KEY WORDS *Manusmruti*. Ethnobiology. Ecological Factors. *Mahaabhootas*. Creation of Life. Nature's Expansion and Ramification.

ABSTRACT Ancient Indian science was pioneered to identify the ecological factors (*Mahaabhootas*): Ether, Air, Fire, Water and Earth and had realized their effect on biological system at the subtle level. The concept on origin of life was emphasized more on metaphysical (but scientific) principles, in addition to the modern theory of chemical evolution.

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