

# The Biochemical Basis of *Soma*

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## I. Introduction

Intelligence and existence—consciousness and physiology—abstract mind and concrete body: These are two separate and incommensurate worlds. On the one hand, there is the world of pure subjectivity, pure spirituality, unboundedness, devoid of any physical material content; on the other hand there is the material universe, with its fundamental forces and interactions, the fine particles, the atoms, molecules and macromolecules, and the organelles, cells, and organs which are the constituents of the human body. The individual human being experiences both poles, both extremes, from the abstract silence of pure subjectivity to the infinite dynamism of the physical universe.

Are these truly separate worlds, or is there a connection between them, could there be a continuum of life which flows between intelligence and existence, connecting both together into one wholeness? Ancient Vedic science claims that there is a material, a liquid, a chemical, which stands at the junction point of intelligence and existence, creating a link between the two. It is the meeting point where intelligence flows into the field of existence, the finest level of physiology where primordial consciousness expresses itself as primordial matter. It is called *Soma*. *Soma* is that finest physical material which viewed from one perspective is abstract, non-material pure intelligence, and viewed from another perspective is an extremely fine and delicate expression of matter. In *Soma*, the unity of intelligence and existence is comprehended, and the continuum between unbounded pure consciousness and the material creation is manifested.

The ninth mandala of Rig Veda provides a comprehensive encyclopedia of *Soma*, defining the entire range of existence, and the full range of states of consciousness in terms of sequentially unfolding layers of expression of that finest link between intelligence and existence, *Soma*. However, the ninth mandala of Rig Veda has not been understood heretofore in modern terms; a connection between the ancient Vedic language, and the modern terminology of physics and biochemistry has not been made. Can we understand the relationship between consciousness and physiology that was comprehended ages ago by the seers of the Rig Veda in the language of modern biochemistry?

In this essay we are proposing that *Soma* is the proton gradient

across the inner mitochondrial membrane which drives the process of ATP synthesis, and is therefore fundamental to every activity and transformation which takes place in the physiology, and in the activity of the organism as a whole. The proton gradient is a non-material sort of thing—it is an abstraction, a relationship of charges. An atom consists of closely bound positive and negative charges, protons and electrons. Through chemical means in the process of aerobic metabolism, these opposite charges are separated and made to perform useful work. The separation of these charges across the distance of the inner mitochondrial membrane—a few hundred Angstroms—is sufficient to open up the full dynamic range of biological possibilities. The abstract relationship between positive and negative charges is stretched across the mitochondrial membrane: The primordial relationship of proton and electron which constitutes the atom, is acted out on a larger stage, with broader time and distance scales. The opposite charges are made to flow, to unfold their mutual relationship on the biochemical level. In the broader stage of time and distance across which protons and electrons are made to flow, the seed of creation of the world of biological activity may be located. The proton gradient is made to serve the functioning of intelligence in the cell, and in that relationship between the intelligence of the cell embodied in the DNA, and the external matter serving as fuel is the coming together of Intelligence and existence, consciousness and physiology.

We will take a close look at the functioning of the proton gradient from the viewpoint of biochemistry, and then we will identify these principles of life as they are expressed in the ninth mandala of Rig Veda. Finally we will evaluate this understanding of *Soma* in terms of the knowledge of *Soma* presented by Maharishi in the Science of Creative Intelligence, and the experience of *Soma* by individuals practicing the TM and TM-Sidhi program.

## II. Proton Gradient: The Meeting Point of Existence and Intelligence in the Cell

Proton gradients are the penultimate source of energy in aerobic biological systems. The proton gradient is a reservoir of energy and intelligence which is virtually unbounded, a reservoir which the cell draws upon continuously for all of its metabolic activities. The role of the proton gradient in supporting metabolic activity in the cell is like the role of the bank in economic systems. By virtue of the support of its wealth, all the myriad activities of the organism can be structured.

The proton gradient is a reservoir of biological energy; its first expression is the currency which is carried throughout the cell, the

messenger of that unbounded reservoir of energy and intelligence. That currency is the ATP, adenosine tri-phosphate, an energy-rich molecule, which is used throughout the cell to aid in catalysis. Reactions which do not proceed quickly on their own, can be catalytically coupled to the hydrolysis of ATP to ADP. The energy that is released in the hydrolysis of ATP is then used to drive forward the specific desired (coupled) reaction. ATP is a universal currency of energy in the cell, used to drive the catalysis of countless thousands of different reactions in the cell. ATP is the congealed or expressed, particulate, communicable, or we may say, travelling emissary of the source of energy in the cell, which is the proton gradient.

ATP is a package of energy and intelligence. As a package of energy, it can be quantitatively defined as having the size of -7.3 kcal per mole. ATP must also be considered as a package of intelligence, because it is a relatively stable molecule. It holds on to its energy, until that energy is put to use in an enzymatically catalyzed reaction. The energy of ATP is available for use by the intelligence of the cell. The energy of ATP may therefore be said to be extremely orderly.

It is not a crude energy, but rather a directed, servile energy. It is this discriminative ability to reserve its energy for use to serve the needs of the cell that makes ATP an impulse of biological intelligence as well as an impulse of biological energy.

The energy for the formation of ATP from ADP is drawn from the proton gradient by a complex of coupling factors, called FO and F1. FO acts as a proton channel, through which protons flow down the proton gradient, providing the energy that drives the catalysis by F1 of the phosphorylation of ADP to ATP. The protons which were removed from the mitochondrial matrix in the creation of the proton gradient, are allowed to flow back across the inner mitochondrial membrane to the mitochondrial matrix through the coupling factor FO while concomitantly ATP is being synthesized, catalyzed by F1.

This summarizes the intelligence aspect of the functioning of the proton gradient: How the proton gradient is systematically put to use to serve the purposes dictated by the intelligence of the cell, embodied in the DNA, where the blueprint for the biological activity of the cell resides. The creation of ATP marks the entry into the field of intelligence, because from here, the energy has been transformed into the universal mobile currency which can be made available throughout the cell to serve the designs of the intelligence of the cell.

The proton gradient is created by the metabolization of foodstuffs. Foodstuffs are broken down in three steps. In the first step, large

molecules in the food are broken down into smaller molecules. In the second step, these smaller molecules are broken down to a few simple molecules which can be directly utilized by the cell. In the third step, called the citric acid cycle, the acetyl groups derived from the breakdown of fatty acids, sugars and amino acids, are completely metabolized to carbon dioxide and water, yielding energy in the form of the electron transfer capability, or redox potential of NADH. The electron transfer capability of NADH is made use of to create the proton gradient.

The electrons which NADH has to donate are destined to oxidize molecular oxygen, to form  $H_2O$ . Instead of donating the electrons immediately to the oxygen, the electrons are passed along a series of intermediaries in what is called the respiratory pathway. The process of passing along the electrons from one intermediary to the next is coupled to the pumping of protons out of the mitochondrial matrix. That is to say, as the electrons from NADH are passed to NADH-Q reductase, to QH<sub>2</sub>, to cytochrome b, to cytochrome c<sub>1</sub>, to cytochrome c, to cytochromes a and a<sub>3</sub>, and finally to O<sub>2</sub>, moving progressively from the mitochondrial matrix to the intermembrane space, across the inner mitochondrial membrane, protons are pumped in the same direction, creating a proton gradient across the inner mitochondrial membrane, and a surplus of protons in the intermembrane space. The redox potential of NADH is transformed by this mechanism into the proton gradient.

As the electrons traverse the inner mitochondrial membrane, having been donated by NADH, they participate, or contribute to the activity of three pumping stations. At each of these sites, the transfer of electrons is coupled to the pumping of protons and corresponding creation of the proton gradient. These sites function to conserve the energy that is being lost in the exogenous reaction of the oxidation of O<sub>2</sub> to 2H<sub>2</sub>O.

The energy is flowing downhill; these sites, namely the NADH-Q reductase complex; the QH<sub>2</sub>-cytochrome c reductase complex; and the cytochrome c oxidase complex, make use of that down hill flow of energy to create the proton gradient.

The proton gradient is a relationship of charges. It is an abstract field of pure energy, pure electro-motive force. It is the final breakdown product of the food-stuffs that are taken in by the organism. Sugars, fats, and proteins are taken in, and they are refined and refined, and ultimately they are broken down to an abstraction, a relationship between positive and negative charges, stretched across a narrow membrane. Between the pure energy derived from the foodstuffs, and the pure intelligence embodied in the ATP, the currency which serves the activity of the intelligence of the DNA, there is a gap. That gap between existence and intelligence is

located in the gradient across the mitochondrial membrane.

In that gradient, in that gap, existence meets intelligence. That proton gradient, functioning as the infinite reservoir for the expression of energy and intelligence in the biological organism, traversing the abstract boundary line between outer existence and inner intelligence, is the Soma. The proton gradient of the inner mitochondrial membrane is the *Soma* described by the seers of the Rig Veda.

In this section, we have described the meeting point between intelligence and existence at the fundamental level of the functioning of the cell, from the viewpoint of modern biochemistry. We have seen that there is a junction point in the cell where the outer values of physical existence, embodied in the foodstuffs that are taken in by the biological organism, meet the inner values of intelligence of the cell, the innumerable activities of the cell dictated by the blueprint of intelligence in the cell, the DNA. These fundamental, we may even say primordial values of existence and intelligence have their meeting point in the cell in the proton gradient generated across the inner mitochondrial membrane. This gradient where existence and intelligence meet, we are calling 'Soma,' and we are proposing that this is the biochemical reality of that abstract material described in the ninth mandala of Rig Veda as the drink of the gods. In the next section, we will examine the historical record, the texts of the ninth mandala of Rig Veda, to verify whether a correspondence can be established between the insights of the seers of modern biochemistry, and the visions of truth by the ancient seers of the Veda.

### III. *Soma* in the Ninth Mandala of Rig Veda

We will begin our investigation into the testimony from the ancient record on the nature of Soma, with the first richa of the ninth mandala of Rig Veda. The entire ninth mandala is devoted to the knowledge of Soma. According to the Maharishi Apaurusheya Bhashya, the Rig Veda unfolds knowledge sequentially. Therefore the entire knowledge of the ninth mandala may be located in seed form in the first Sukta of the ninth mandala, and in the first richa of the ninth mandala, and even in the first word of the ninth mandala. The entire mandala is the detailed elaboration of the first word.

The first richa is sung in the Gayatri meter. The meter organizes the content of the richa into a specific form or format. In the Gayatri meter, 24 syllables are divided into three padas, eight syllables each. The first pada presents the adhyatmika knowledge of the richa; the second pada presents the adhidaivika knowledge of the richa; and the third pada presents the adhibhautika knowledge of the richa. Together, the three

padas present a complete package of knowledge, giving detailed expression to that specific law of nature as its influence traverses through the worlds of Self, mind, and body.

The first eight syllables, comprising two words of the first richa of the ninth mandala, therefore, present the knowledge of the adhyatmika value of the knowledge of Soma: *Soma* as it relates to the rishi, the knower, the experiencer. These words characterize the Soma, that is they present the characteristics of the experience of the knower which invariably accompany Soma, and may therefore be considered its distinguishing or defining characteristics: The words are "Svadishtaya" and "Madishtaya." The word svadishtaya means "characterized by the infinite or superlative degree of sweetness." The word madishtaya, often translated as "intoxicating", refers to the characteristic of being able to make use of the full potential of all the functions of consciousness, the five senses, mind, intellect and ego. These two words characterize the *Soma* in terms of its objective and subjective sides respectively: Soma, linking subjectivity and objectivity, is itself not experienced directly—the linking value is a gap, a non-entity. The shores of the river which are connected together by the flow of *Soma* are seen, while the gap between them is not seen, it remains unmanifest. Thus these two words, characterizing the experience of the *Soma* in its objective and subjective modes, together point to the transcendent unmanifest value, which is the pure Self. In this way, these two words, while at the same time describing the nature of Soma, are providing insight into the nature of the Ātman, the unmanifest Self.

Let us look more carefully at the first word, svadishtaya. The superlative suffix requires some explanation. What is the relevance of comparative degrees of sweetness to the nature of Soma? If we look at the metabolism of glucose, we may locate a superficial value of sweetness in the glycolytic pathway. The glycolytic pathway breaks down the six carbon sugar, glucose, into two three-carbon fragments. In this process of breakdown, some energy is released, some "sweetness" is experienced, but it is of a very superficial degree. Only a very small amount of the free energy which is contained in the glucose molecule is metabolized by this process. The glycolytic pathway presents the limit of what energy can be extracted from glucose in the absence of oxygen. But this is not the biochemical process which is referred to by the word svadishtaya: A more intense, more profound value of sweetness is intended.

The three-carbon fragments, called pyruvate, derived from the breakdown of glucose in the glycolytic pathway are further broken down into two-carbon fragments, called acetyl, at which point they are carried into the citric acid cycle by coenzyme A. The two carbon acetyl

is completely broken down to carbon dioxide in the course of the citric acid cycle. This breakdown of glucose by the citric acid cycle yields a much greater amount of energy than glycolysis, even an order of magnitude more. Glucose that is carried through to this complete degree of metabolism by the citric acid cycle is more intensely sweet than glucose that is broken down only by the glycolytic pathway. However it would be fair only to consider it comparatively more sweet. In this line of argument, what would be characterized as most sweet?

If we understand sweetness to be the taste of pure energy, the perception through the sense of taste of the potential of that substance to create energy during the process of metabolism, then the expression 'most sweet' would only rightly belong to a virtually unbounded, unlimited reservoir of energy. The citric acid cycle yields more sweetness than glycolysis, but for more and more to give way to most, to the superlative degree of sweetness, the quantity, the degree of sweetness must pass beyond measure. If it can be measured, then there will always be the possibility of something more. Such an unbounded reservoir of energy we have already located in the proton gradient in the inner mitochondrial wall. Since any amount of energy can be extracted from it without limit, it presents the quintessential experience of sweetness, a field of pure energy, an unlimited supply of energy. The proton gradient is the most intense degree of sweetness which could ever be available to a biological system. Implicit in this discussion has been the equation between energy and sweet taste. Strictly speaking, the phenomenon of taste can not be extended to the biochemical field. The proton gradient is not available to be tasted. Yet, taste is an experience of the biochemical properties of materials. It does not seem inappropriate to make use of the sense of taste as a metaphor for specific biochemical phenomena, especially when the correlation that is drawn has a real biochemical basis. Sweet things taste sweet because they have a molecular structure which for eons has been associated with the potential for extracting useful energy. The attractiveness of the sweet taste is built into the design of the biological organism, in that universally organisms move by nature in the direction of nutrients that are useful, in order to survive. The use of the term sweet by the ancient Vedic rishis, is in accordance with the timeless blueprint for biological activity, and by no means represents an anthropomorphization of the biochemical field. The word svadishtaya directly takes the attention to the field of infinitely intense sweetness, the field of virtually infinite energy for the biological organism, the source of all energy, the proton gradient within the inner mitochondrial wall. The word svadishtaya is thus an extremely compact short-hand for describing the fundamental feature of

aerobic metabolism, the virtually unlimited fund of energy which the cell has available to draw upon.

The rest of the richa, and indeed the rest of the ninth mandala may be understood as a detailed elaboration on the nature, evolution and application of that infinite reservoir of energy, described in biochemical terms as the proton gradient.

The second word, madishtaya, shows the other side of the energy equation, namely how that infinite energy is put to use in the service of the individual human being. The word mada is commonly translated as intoxicating, but its true sense is quite opposite. The intoxication brought about by alcohol, for instance, involves a deadening of the senses, and a restriction of mental powers. A person intoxicated with alcohol will perform poorly in all manner of perceptual and intellectual tasks. Alcohol interferes with the normal and efficient functioning of the nervous system. The word mada refers to an intoxication which sharpens, heightens the functioning of all the functions of consciousness. With mada, hearing becomes sharper, vision more acute and vigilant, touch more sensitive, taste more delicate, and smell more capable of discerning and distinguishing faint odors. The mada-intoxicated mind is capable of more profound thought, with broader comprehension and at the same time greater ability of comprehension. The intellect becomes capable of delicate and more fruitful discriminations in favor of progress of the individual; and the ego enjoys more happiness and positive uplifting values. This is the characterization of the kind of 'intoxication' described by the word mada. 'Fulfillment,' 'exhilaration,' or 'enlivenment of the ability to use the functions of consciousness,' convey the sense of the word better than 'intoxication.'

The 'madishta' or superlative degree of enlivenment of the ability to use the functions of consciousness, signifies the degree of enlivenment which raises the capability of performance of the senses to their highest level, the infinitely expanded and perfected capability of the functions of consciousness. This supreme degree of competence of the functions of the senses is familiar to us in terms of the ability of perception in the seventh state of consciousness, where the infinite value of the object of knowledge can be appreciated. The supreme value of functioning of each of the functions of consciousness may be described as raising these channels of consciousness, channels of intelligence to their full potential. Thus madishtaya means 'characterized by the enlivenment of the ability to use the full potential of all the functions of consciousness, senses, mind, intellect, and ego.' Whereas the first word of the ninth mandala brought out the knowledge of the supreme level of physical existence, the most



fundamental realm of the biochemical existence of life, the second word describes the supreme level of expression of intelligence in the highest, most refined level of functioning of the human nervous system in unity consciousness.

Having on the one hand the appreciation of the full potential of the field of existence, and on the other, the utilization of the full potential of the field of consciousness, the highest, supreme value of *Soma* is characterized in this first pada, dealing with the adhyatmika value, the knowledge of *Soma* pertaining to the Self. Two aspects of *Soma* are delineated: its objective aspect of infinite energy, and its subjective aspect, of enlivenment of the full potential of consciousness. We understand these as two phases or more precisely two faces of one reality. But where is the connection between the two? How are the supreme values of existence and intelligence connected, how are they linked together? The articulation of the answer to this question is presented in the second pada which delineates the adhidaivika aspect, the organizing power of the pure knowledge. The answer to the question of how intelligence and existence are connected together is answered, albeit in seed form, in the first word of the adhidaivika pada, 'pavasva.' Pavasva is the second person imperative of the root pu. Pu means to part, to separate, to create a gap between. Thus the sense is "You must create a gap between [existence and intelligence]. Creating a gap, a space, a place where there is nothing, a transcendental rift, is the key to the connection between existence and intelligence. In that gap is an intermediate space, a field which is neither strictly speaking intelligence, nor strictly speaking existence, nor a mixture; it is a third thing, the thing which separates. We may call it the gap. Fundamentally it is only a concept of relationship. Intelligence and existence, which are ultimately the same thing, are made separate, pulled apart. And that thing which distinguishes, pulls them apart, separates and thereby affirms the positive existence of the two, is precious. What it has done? It has created life. Life is the playfulness between existence and intelligence—two values which are not different, but when held apart, give rise to progressive levels of structure leading to the formation of the tremendous expressed complexity of the human nervous system, the human physiology. This is the secret how intelligence and existence are connected: They are connected by an abstract relationship which holds them apart and at the same time relates them to each other: They are connected by the gap, the division between their own intrinsic natures. The word pavasva is therefore the fundamental formula for creating life: Separate these two values, existence and intelligence, create a gap between the two, maintain that separation, even though it is only an abstraction, a concept. The

formula for life is given in the first word of the second pada. The name of that is given in the second word.

What do we call that gap which is creating a separation between existence and intelligence? What is that river which is flowing between these two opposite shores? That which is invoked or enjoined to create this separation between the highest level of existence and the supreme level of intelligence, is called Soma. The three preceding words have been sufficient to create a map, a graphic description of the creation of relationship between intelligence and existence. Now that abstraction is given a name. The use of *Soma* in the vocative case is indicative that the word embodies or encapsulates all that has been said so far: The sequential unfoldment of knowledge in the richa has progressed so far, and now the entire knowledge of the ninth mandala can be precisely comprehended in a single word. Whether we speak of the evolution of the field of existence, or we speak of the development of intelligence, it is 'Soma' which embodies that most delicate relationship at the finest level of creation which is the ultimate source of the field of existence and the field of intelligence. It is for this reason that we say that the entire knowledge of the ninth mandala is devoted to Soma.

The last word of the adhidaivika pada is dharaya. Dharaya, in the instrumental case, is giving the accompaniment to Soma, the characteristic of Soma. The word dharaya has several roots, which contribute to the overall sense of the word. Foremost is the root dhav, to flow. *Soma* is characterized by a flow, a liquid-like movement, as in a stream, connecting the two banks with a flow that continually folds one into the other, creating a matrix, a structure of relationship that evolves into higher and higher levels or orders of complexity. Dharaya also comes from the root dhri which means to support, sustain, hold in balance, maintain in equilibrium. From root dhri comes the word dhara, meaning sharp edge or dividing line. *Soma* is characterized by all of these: *Soma* is the fine line of division between existence and intelligence; *Soma* is the supporter, the sustainer, that which holds the two fields of existence and intelligence in balance, which maintains equilibrium in their contact; and *Soma* is an evolving flow of relationship, an activity, a movement in the gap, which has a liquid structure: *Soma* is a liquid.

If we return to our discussion of the biochemical basis of Soma, we said that *Soma* was the proton gradient in the inner mitochondrial membrane. We showed how the fundamental values of existence, and the fundamental functioning of intelligence could be located in that gradient. The membrane creates a separation, a gap in space generated by the physical asymmetric orientation of the sequence of molecules in

the respiratory chain. The membrane is the site where you create the gap, 'pavasva,' the separation which creates the basis or life. Mitchell describes the simplicity and fundamental character of this membrane: "The transduction of energy by proticity is marvellously simple and effective because all that is required is a thin topologically closed insulating lipid membrane between two aqueous proton-conductor phases." The membrane creates the separation in space which allows the unfolding of the full value of intelligence on the biochemical level, based on the complete aerobic breakdown of foodstuffs.

The word *Soma* comes from the root *su*, which means to extract, or to make ready, prepare. These two meanings of the root give the two faces of Soma: On the side of existence, extracting the finest quality of the foodstuffs in the process of metabolism; and on the side of intelligence, preparing for all possible values of activity in the cell by the creation of ATP. *Soma* is that thing which puts those two values together: in biochemistry it is called the proton gradient.

The word *dharaya* also has very great significance on the biochemical level. The proton gradient is not a frozen separation, but rather it is a dynamic flux. Energy in the form of ATP is constantly being made use of in the cell, and energy, usually in the form of glucose is constantly being broken down. The gradient is therefore not a frozen statue, but a constant flow. Because there is a flux of energy, which varies greatly depending on the demands being made on the cell, there are mechanisms, such as respiratory control, which regulate the speed of breakdown of foodstuffs, and the speed of synthesis of ATP. These mechanisms maintain the energy level of the cell—the proportion of unused ATP molecules in the cell—within very precise limits. Thus, the flow of energy across the mitochondrial membrane is maintained within very narrow limits. This character of maintenance of balance and equilibrium under varying conditions of flow is expressed by the word *dharaya*. The word *dharaya* may be said to give a more elaborated, more detailed picture of the characteristics of the proton gradient.

In this second, *adhidaivika pada*, the mechanics of relationship between existence and intelligence have been presented. The third and last *pada* is the *adhibhautika pada*. The third *pada* delineates what the end result is, that is what is the practical outcome of the mechanism which connects intelligence and existence, by establishing a balanced flow across the gap between them. If the second *pada* is understood as positing the play of life on the boundary of existence and intelligence, the third *pada* establishes the fruit of that fundamental relationship.

The first word of the third *pada* is *indraya*. This word means, "for

the sake of Indra." Indra is the president or chairman of the board. He is the wholeness made up of all the parts. The fruit of the relationship that is created between existence and intelligence is for the sake of the knower, the consciousness of the individual human being who is that whole that is more than the collection of parts of individual cells contributing their separate activities. Consciousness is what is created by the relationship between existence and intelligence, by the flow of *Soma* across the gap. For the sake of that great wholeness which we call consciousness, *Soma* flows across the gap between intelligence and existence.

This brings the entire consideration of *Soma* into focus. The purpose of studying the relationship between existence and intelligence on the level of biochemistry, is to see the sprouting of consciousness from its primordial seat in the proton gradient, through all the stages of its evolution to that highest stage of evolution, the fully developed human nervous system functioning in unity consciousness. The seer posits that the proton gradient, and with that the entire associated machinery of the cell, and all the differentiations of cellular activity that have evolved over billions of years giving rise to the physical nervous system—these are all for the sake of consciousness.

It is the consciousness of the individual human being which drinks the *Soma*, which puts to use the flow of protons across the proton gradient to enjoy the enlivenment of the full potential of all the functions of consciousness. The proton gradient exists, the seer says, in order for the wholeness of consciousness, Indra, to enjoy, to drink.

The second word, *patave*, means to drink or quaff. Indra drinks the *Soma*, and by drinking the *Soma* becomes strong. Consciousness becomes whole, becomes integrated: That is the fruit of the *Soma*, whose flow is drunk by the consciousness of the knower, the consciousness of the individual in whose body the protons are flowing across the gradient. It is significant that it is not the relationship itself which is drunk, but the flow in that relationship which is drunk, enjoyed by consciousness. The *Soma* is a liquid, it is a flow, an ever-evolving flux of relationship, and that flow of relationship is enjoyed, not on its own level, but on a much higher level: Not on the level of the individual cell, but on the level of the wholeness of the collection of all the cells, there the fruit of the flow is enjoyed, there the *Soma* is tasted.

The final word sums up the entire discussion: *sutah* means, "is pressed out." The sense is, for the sake of Indra to drink, the *Soma* is pressed out. The proton gradient, which is an abstract relationship between charges, which we have understood to have at its basis the abstract relationship between existence and intelligence, is pressed out:

It is congealed, made into concrete form. The proton gradient is made into ATP. ATP is the concrete expression of the proton gradient. It is squeezed out, pressed out by the action of the coupling factors which put the proton gradient to work to phosphorylate ADP to make ATP. Like the juice extracted from a plant, which juice embodies the nutrients, the active essence of the life of the plant, the ATP embodies the abstract relationship of existence and intelligence that is stretched over the mitochondrial membrane in the form of the relationship of charges, the proton gradient. ATP carries energy, but it is a directed energy, easily made use of by the enzymes which serve the activities of the cell. Intelligence and existence are squeezed together, compressed, expressed in this one highly useful molecule with its high energy bonds.

The richa concludes by this reference to the juice of the Soma: the concrete, manifest expression of the abstract relationship between intelligence and existence. We see ATP, not as Soma, but as the juice of the Soma: The concrete expression of the abstract relationship that is enshrined in the proton gradient. ATP is the fulfillment of the supreme value of sweetness, the state of pure energy which was introduced in the first word of the richa. We have been carried along a path of transformation in this richa, starting from a state of pure infinite energy, characterized as intense sweetness, leading to the expressed, practically utilizable, precious for consciousness, functional embodiment of pure energy, ATP. In this progression, this transformation, we see the expression of one law of nature, one richa of the Veda.

The Maharishi Apaurusheya Bhashya teaches us that the knowledge of the whole is contained in seed form in its first expression. In this first richa of the ninth mandala, we have in seed form the entire knowledge of the ninth mandala. From that seed of relationship between positive and negative charges in the proton gradient we saw the emergence of ATP as the expressed embodiment of that abstract relationship. We can expect, as the mandala progresses from its abstract pole, the fullness point, at the beginning, to its concrete pole, the emptiness point, at the mid-point after the 57th sukta, and back again to fullness at the end of the 114th sukta, that the entire spectrum of human consciousness from sleep to Brahman consciousness, and the entire hierarchy of human physiology from organ systems to the finest abstract relationship of energy and matter, and all the values of relationship between the two, consciousness and physiology will be exhaustively mapped out. The seed for this immense tree of practical wisdom of life has been set forth in this one richa, which shows the relationship of existence and intelligence put to work for the development of consciousness, at the fundamental biochemical scale of life

of the organism. This profound insight into the knowledge of the ninth mandala gained through application of modern biochemical principles to the understanding of the basic principles of life propounded by the ancient seers promises to restore the full depth of infinite wisdom of life contained in the Rig Veda, called the encyclopedia of the Science of Creative Intelligence.

We have seen that the ancient Vedic seers have uncovered the knowledge of the fundamental relationship between existence and intelligence at the basis of the life of the cell, and have called it Soma. And we have seen that the *Soma* which the seers of the Rig Veda describe is the same as that which is called the proton gradient in the language of the seers of the modern age, the scientists of biochemistry. In the next section we will consider our understanding of *Soma* and the proton gradient in cells, in the light of the knowledge of the Science of Creative Intelligence, as taught by Maharishi Mahesh Yogi.

#### IV. *Soma* in the Light of the Science of Creative Intelligence

So far we have understood the proton gradient as a relationship of charges, structured as a gradient across the inner mitochondrial membrane. From that proton gradient ATP is synthesized, and with the help of the energy from ATP, all the various activities of the cell are carried out. Through the various activities of the cells in the body, the physiology of the organism is structured, and on the basis of that physiology, the behavior and experience of the organism. The relationship of charges, drawn out by the respiratory chain across the mitochondrial membrane, is the biological foundation of the expression of life. This abstract relationship of charges, the source of the unlimited potential of biological existence, may be extrapolated in the opposite direction, in the direction of increasing abstraction: This leads us to an understanding of the structure of pure knowledge as it is understood in the Science of Creative Intelligence, and how that structure comes to be expressed in biological systems.

The Science of Creative Intelligence locates all possibilities in one structure of wholeness, one totality, one unity expressed in the phrase, "The Fullness of Fullness." That Fullness, because it contains all possibilities within its structure, locates its own opposite value within itself. That opposite value is emptiness, the abundance of emptiness, said to be the "Fullness of Emptiness."

Fullness of Fullness and Fullness of Emptiness are the two opposite poles, the two extremes of the one structure of unity. That aspect of fullness which is awake to its own nature—fullness is by nature self-

referral, self-knowing—reverberates back and forth between the extremes of Fullness and Emptiness. By virtue of its nature to know itself, it explores all of its possibilities until it locates its own point value, its own value of nothingness. Then in recoil, in shock from that recognition of the shameful value of nothingness within its structure, it explores again all the increasing values of its own nature until the fullness of fullness is again realized. There is thus an eternal flow within the structure of fullness, reverberating back and forth between fullness and emptiness. This flow, this reverberation has its basis in the existence of two opposite values. In the relationship of two opposite values, the gap between the two opposites is of paramount importance. It is the gap which structures the relationship of the two opposites, holds them apart and together, allowing each to exist by virtue of the other. The abstract principle of relationship between opposite values is the guiding principle underlying the systematic unfoldment of the Vedic mandala. The Vedic mandala is the expression of pure knowledge. It is the expression of the move of fullness on to emptiness, and the progression of emptiness back to fullness. The unfoldment of knowledge follows this theme of elaboration based upon the relationship of the two opposites, fullness and emptiness. Closer investigation reveals that the gap is located not only at the mid-point of the mandala. The gap is the unmanifest value which holds together the two halves of the mandala, the first half collapsing from infinity to a point, the second half expanding from point to infinity. There, at the junction point of the two halves, at the midpoint of the mandala, the gap preserves the continuity of flow and saves the progression of knowledge from being lost in inertia. Even closer examination reveals that not only does the gap hold together the opposite suktas situated on opposite sides of the mandala, but the adjacent suktas are held together in the structure of pure knowledge by the gap: Indeed, there are gaps between suktas, gaps between richas, gaps between padas, gaps between words, and gaps between syllables. Every gap mediates the collapse of infinity to a point, and ensures the maintenance of the theme of expression in the continuum of pure knowledge. The conclusion is that from the relationship of fullness and emptiness, from the gap separating these two opposite values, the entire flow of pure knowledge unfolds systematically.

The story of *Soma* is the story of how the positive and negative poles of the structure of pure knowledge are held apart, and at the same time made to interact with each other to create the dynamics of flow. There is the story of *samudramanathana*—how the devas and the asuras, the two opposite values got together to churn the ocean of milk to create Soma, the nectar of immortality. By their cooperation, they succeeded in churning

the ocean of milk, they succeeded in collecting the amrit, the nectar of immortality. The story is a precise metaphor for the creation of Soma. The story graphically depicts the interactions of forces that give rise to the flow of energy, and the interplay of intelligence and existence that gives rise to consciousness. What is churned out of the ocean of milk is nectar, the most precious liquid in creation, the liquid which embodies the flow between the opposite poles of existence and intelligence, the liquid which expresses the flow of pure knowledge which is the eternal knowledge of the blueprint of creation, from which the whole creation arose. Ultimately, according to the Science of Creative Intelligence, the entire creation arises from a concept, the concept of the relationship of Fullness and Emptiness in the structure of pure knowledge. In the pressing out of the *Soma* in the relationship of these two opposite values, the syllables and gaps of the Vedic mandala are created. This same process on a much more manifest scale, creates the biochemical basis of life. The churning of the ocean of milk in the story of samudra manthana is a metaphor, describing in apt detail, the abstract relationships which give rise to the flow of Soma, which translates itself into the biological diversity of life on earth, and the multiplicity of the phenomenal universe.

In reviewing the knowledge of the Science of Creative Intelligence, and the role which *Soma* plays in the generation of the structure of pure knowledge, the Vedic mandala, we find that the identification of the proton gradient as *Soma* presents only one regime of Soma. In the Vedic mandala there is the creation of a gap between Fullness and Emptiness, opposite poles: In that unmanifest gap an unmanifest space-time is created, and in that unmanifest space-time, the syllables and gaps of the Veda unfold in perfect sequence. The suktas are like the different chemicals in the respiratory chain which pass electrons from one to the next. Fullness and emptiness are like the positive charges and negative charges which are built up across the membrane. All possibilities in the Vedic mandala correspond to the immense range of biological diversity which emerges from the activities of ATP, put to use by the intelligence of the cell. In both the Vedic mandala and the biological system all possibilities in the range from fullness to emptiness are systematically delineated in the flow which streams from one pole to the other and back. In the case of the Veda the unmanifest space-time is brought to life by the dynamic flow of Soma, and then the flow of pure knowledge in the ten mandalas of Rig Veda gets congealed in the unmanifest space-time as a sequence of syllables and gaps. These are the dynamics of the creation of the flow of *Soma* from the interplay of opposite values, and the emergence from that flow of tremendous diversity.



This is the principle of the unfoldment of law from the viewpoint of the Science of Creative Intelligence, where all law is understood to emerge from the structure of pure knowledge. The relationship between *Soma* as the source of the expressions of syllables and gaps in the flow of pure knowledge, and *Soma* as the source of the synthesis of ATP which drives the innumerable activities of the cell leading in turn to the vast range of biological diversity found on earth—the relationship is not a metaphor, but rather it is the relationship between an abstract principle of law, and its concrete expression in the functioning of law at a specific level of creation. The two values of *Soma* are not different. Only the one is an instantiation of the other, the proton gradient is an exemplification of a broader principle which must have its impact on every level of creation.

It is beyond the scope of this essay to extend the range of application of the principle of Soma—the relationship between existence and intelligence at the fundamental level of creation, and the engendering of flow between these opposite values—beyond the biochemical field. Here on the level of the biochemistry of the cell and its organelles, the dynamics of *Soma* have been made tangible. If indeed, the ninth mandala presents one aspect of the blueprint of creation, then the principle of *Soma* should be located on every level of creation: This does not invalidate or limit the applicability of the understanding of *Soma* to the biochemical level. What we have gained from this analysis of *Soma* in the light of Maharishi's Science of Creative Intelligence is the recognition that *Soma* is a basic underlying principle which expresses itself at different levels of creation: When it is suggested that *Soma* is the glue of the universe, it is not the proton gradient which is held to be the glue of the universe; proton gradient may be the glue of its universe, the universe of the cell or the universe of the biological organism, but it is the underlying abstract principle of *Soma* applied on a universal scale, on the level of cosmic forces of interaction which is holding together the universe, not the tiny electromagnetic forces across the inner mitochondrial membrane which are responsible for the creation of a proton gradient and the synthesis of ATP. Our definition of *Soma* as the proton gradient must be understood strictly within the limits of the biochemistry of the cell, and the associated time and distance scales.

#### V. *Soma* in the Light of Experiences of Higher States of Consciousness

The study of Soma, and the investigation into its physiological correlates is motivated by the role that *Soma* plays in developing higher states of consciousness. Maharishi relates the experience of *Soma* to the

development of perfect mind-body coordination: because *Soma* sits at the junction between existence and intelligence, between mind and body, *Soma* can be cultured to raise the coordination of mind and body to perfection. In the *Ideal Society Book*, (1977) Maharishi explains:

Soma, very popular in Vedic literature, is said to be the glue of the universe—it maintains the eternal continuum of pure existence, the field of pure potentiality, the unmanifest absolute state of life. In the process of maintaining the eternal continuum of the unmanifest, *Soma* expresses itself as unmanifest space/time geometry and thus becomes the source of manifest space/time geometry, which was brought to light by Einstein as the basis of all manifest creation. Maintaining its status at the gap between non-changing unmanifest and the ever-changing manifest, *Soma* gives an evolutionary direction to change and thereby maintains the continuum of the ever-changing relative field of life as well. *Soma* can be understood as something like a fluid substance or impulse of creative intelligence which connects body and mind, physical existence and consciousness. It is the flow of pure *Soma* that organizes perfect functioning of body and mind, develops Ritam-Bhara-Pragyan, and results in higher states of consciousness.

We have understood from our discussions of the flow of Fullness within itself how *Soma* is the source of diversity. The statement that *Soma* sits at the gap between non-changing unmanifest and the ever-changing manifest, governing the changing field, appears to validate our understanding of the proton gradient, at least as far as biological systems are concerned. Similarly, we understood that *Soma* is a fluid, a liquid, that flows in continuous interactions at the junction point between existence and intelligence: organizing perfect functioning of mind and body is a paraphrase for carrying out the interactions between existence and intelligence at the finest level of creation. Furthermore, what we understood as madishtaya, the full potential of-the functions of consciousness, is here given a different expression, as Ritam Bhara Pragyan, and the experience of higher states of consciousness. Maharishi's expression of the nature of Soma, and its role in the development of the full human potential is in complete concordance with our understanding of the nature of *Soma* as the biochemical basis of life.

There is however, a facet of *Soma* brought out by Maharishi's discussion which has not been dealt with by either our biochemical analysis, or our discussion of the structure of pure knowledge: That is the aspect of experience. The structure of pure knowledge is the

structure of the consciousness of the knower. The role that *Soma* plays in the unfoldment of the diversity of the expression of the Veda in the Vedic mandala must have its correlate in the experience of the knower, the experience of the individual human being. How does the individual experience Soma? How is the *Soma* refined, that is, what are the changes that take place that lead to the development of higher states of consciousness?

To answer this question, we must return to a theme introduced in the previous section: There are different levels of expression of Soma. In the previous section, we pointed to the structure of pure knowledge, the ninth mandala of Rig Veda as the underlying principle of law supporting the manifest expressions of life at different levels. The proton gradient was considered to be one level of *Soma* in which the gap between existence and intelligence was bridged. There must obviously be several such levels of expression of Soma. Maharishi explicitly mentions the space-time geometry of Einstein as constituting one level, and the unmanifest space-time of the Veda as representing a deeper level. How many levels are there, and how are the different levels related? This question must be resolved if the total picture of *Soma* is to be comprehended.

We submit that all the different levels of expression of *Soma* are comprehended, that is directly experienced by the knower, the experiencer, the individual human being, progressing through the seven states of consciousness. It is in the simultaneous comprehension and enlivenment of the relationship of existence and intelligence on each level that the full potential of all the functions of consciousness is realized. That comprehension of the full range of experience of *Soma* on all levels of mind and body, in the seventh state of consciousness, unity consciousness, represents the first level of Soma, the level of the ego.

The second level is the level of the intellect. *Soma* on the level of the intellect is that abstract field of kaivalya which separates and holds together the different sutras in the experience of the TM-Sidhi program. It is located in the gap experienced between the different sutras during the practice.

The third level is the level of the mind. *Soma* on the level of the mind takes the form of the mantra in the practice of Transcendental Meditation. The mind experiences the mantra at progressively finer and finer levels, and thereby traverses the whole range of experience from gross relative to unmanifest transcendental: That which connects the experience of all these levels is the continuity of the mantra, which although experienced in changed values at finer levels of the mind, is nevertheless experienced as the same mantra. On the level of the mind,

the mantra provides that connection between intelligence and existence which we understand as 'Soma.'

The fourth level is the level of akasha. Akasha is the domain of shabda, speech. *Soma* on the level of speech is found in the gaps between syllables, between words, between sentences and between paragraphs. In that unmanifest gap, the mind evaluates what has been said so far, and organizes the diction and grammar to bring out the precise values of speech which will further the intentions of the mind. In the gap there is the meeting point between the objectivity of the expressed speech, and the subjectivity of the intelligence or intention which underlies the expression in speech. On the level of akasha, *Soma* is the gaps in speech.

The fifth level is the level of manifest space-time geometry, where *Soma*, operating on cosmic distance scales (that is stellar, galactic, and intergalactic distance scales) holds together the manifest creation.

The sixth level is the level of the sparks of energy and intelligence, the fine particles of matter and fundamental forces of nature operating on the very small time and distance scales. On this level, which incorporates a broad range of interactions from the interactions of quarks, to the structuring of atoms, *Soma* may be the gap between energy levels which distinguishes the behavior of bosons and fermions, and accounts for all the different structures of interactions.

The seventh level is the biochemical level, the level of the proton gradient, which we have already explained at length: The proton gradient is the universal foundation of all biological expression.

The eighth and final level extends from the cellular level to the level of interaction of societies and the world as a whole. The characteristic of *Soma* on this level is the creation of wholeness based on differences. On the level of the individual, creating a wholeness based on the diverse and integrated functioning of many different kinds of cells; on the society and world level, creating a wholeness based on the integration of differences, putting the differences together in one wholeness of collective consciousness.

These are the eight levels of *Soma*, corresponding to the eight values of prakriti. The eight prakritis are the eight-fold nature of Krishna, earth, water, fire, air, space, mind, intellect and ego, described in the Bhagavad Gita. The blueprint for the functioning of *Soma* on each of these levels may be found in the ninth mandala of Rig Veda. By detailing the relationship between existence and intelligence on each one of these levels, the Rig Veda provides the complete encyclopedia of the knowledge of *Soma*.

Having delineated eight levels of *Soma*, it is appropriate to

turn our attention once again to the first of the levels, the level of the direct experience of the full range of expression of *Soma* on all levels, appreciated fully in Unity Consciousness. The speciality of this first level is that it integrates, correlates and puts together the value of experience enlivened in each of the other seven levels. This integrating value is of fundamental importance to the understanding of Soma. It is necessary that the different senses should be enlivened for their full infinite values, but it is also necessary that all the functions of consciousness should be integrated, bound together as the various rays, the various limbs or levels of one single integrated personality, the human being. This integrating value of Soma, *Soma* at its supreme level of expression, presents the evolution of the ego, the experiencer, 'ahankara.' All the different levels of *Soma* are put together in the consciousness of the experiencer. The enlivening of the different levels of the Soma, the enlivening of the different functions of consciousness is the ripening of the fullness of the experiencer, the raising of the wholeness of the personality made up of various limbs or rays, to its infinite potential.

The evolution of this integrated value of ahankara, that is the development of the complete integration of the consciousness of the knower, is intimately tied to the simultaneous enlivenment of each of the functions of consciousness, on all of the different levels of their expression. The functioning of *Soma* on each level must be fully appreciated, and the interconnections between all the different levels must be fully appreciated, and the wholeness of all the different levels must be appreciated. That path to the complete integration of the knower, wherein the experiencer rises from gross experience through the senses, to the appreciation of the infinite value of the object of knowledge through each sense, and the comprehension of the wholeness of all the different levels of creation as expressions of the unity of his own self—this is the path of evolution of consciousness, the path of development of higher states of consciousness. The relevance of *Soma* to that path is that it is *Soma* that is being enlivened on each level of creation, when the knower, the experiencer is progressively enriched, or we may say 'evolved.' Evolution of experience can be a progressive, step by step transformation, because it is not the reality of the different levels which is being created, rather it is the appreciation of the experiencer which is extending to greater and greater values in each realm, eventually appreciating the infinite value of *Soma* in each realm.

The appreciation of Soma, the appreciation of that flow which is connecting intelligence and existence on each of the eight levels is the feature of life which grows through the practice of the Transcendental

Meditation and TM-Sidhi program. In the light of this understanding of the connection between *Soma* and the development of consciousness through the TM-Sidhi program, it will be useful to examine experiences by individuals practicing the TM-Sidhi program and describing the nature of *Soma*, to see if their expressions correlate well with our understanding.

IA. "I experience *Soma* being produced in the midbrain between the two hemispheres. It enlivens all areas of the brain, then it streams throughout the body. Particularly, it streams up and down the spine to feed seven psycho-physical centers, and then from there further feeds the body."

This seems to be describing the *Soma* we described as level one: The *Soma* of the ego. That *Soma* flows as a connectedness between all the different areas of the nervous system. The seven psycho-physical centers referred to may be the generators of the other seven values of *Soma* that are encompassed in the experience of the wholeness, bliss, by the experiencing ego. The source of the *Soma* being produced is described as the mid-brain: Perhaps it refers to the seat of the ego in the thalamus or hypothalamus.

IB.: [The *Soma*] also streams to enliven the five senses which feel to be connected in a channel sort of way to the area between the eyebrows, but slightly above that area. It flows as a superfluid-zero viscosity liquid produced in the midbrain. It sometimes is felt as fountainhead-gushing spurts. ... I most strongly experience this [as a] cyclic flow in the crown of my head and a bit above the third eye area.

*Soma* enlivens the five senses. What is remarkable in this description of experience is the claim that *Soma* flows with zero viscosity. This requires a room-temperature macroscopic coherent ground state phenomenon: The entry onto the molecular or cellular level of the characteristics of a perfectly ordered quantum mechanical system. It is not at all clear from this experience whether *Soma* is a liquid in the usual sense, or could also be understood as a cascade of firing neurons transferring the locus of control, the locus of experience across a spatial network in the brain. Such a superfluid liquid could hold together, that is relate a vast array of individual perceptual components of experience with infinite correlatedness of the parts in a compact wholeness of Self-interaction. The notion of superfluid flow of *Soma* suggests that *Soma* imparts to the senses the capacity to correlate every datum of sense perception to the Self, creating a relationship of Self-interaction, Self-referral between the knower and the object of knowledge. This quantum mechanical relationship which raises the object more and more to the

status of the subject, should account for the reported experience of the senses being enlivened.

1C. "I frequently experience a cyclic flow of *Soma* associated with sensual perception. When this cyclic flow in the middle of the forehead is experienced along with external sensual perception, then *Soma* flows ... in a measured, metered flow."

*Soma* shows itself to be correlated with the rhythm of speech. We recall that one level of *Soma* was constitutive of the structure or meter of speech. That value is incorporated into the quality of *Soma* which has been recounted in this experience:

ID. "This unifies perception, senses, and consciousness. Much of the time, the love, bliss, and what I call *Soma* zooms ahead of the intellect, mind and senses, warming up and preparing consciousness so that perception can take place. Then the boundaries of perception are very soft, with a sublime quality, as an object of devotion, no matter what the object of perception. Every perception thus physically thrills the heart, expands the mind, and physically purifies the body with bliss of Self's influence in terms of *Soma*.

This is a beautiful description of how *Soma* on the level of the ego unifies and enlivens all the functions of consciousness, and expands the territory of influence of the experiencer out through the channels of perception and action. This same experience continues:

1E. "The breath is often suspended or as if fluttering internally, not through the nostrils. . . . The bliss sustaining the body is a combination or unification of *Soma*-prana at that finest level of physical existence and feeling. There seems to be an overall cyclic synchrony of energy when this bliss is switched onto automatic, making my body stronger, and more unified with consciousness and the bliss of the whole creation. "

This experience seems to relate to *Soma* as the proton gradient. There is the connection with breath, and the awareness of energy. The cyclic synchrony of energy may refer to some phenomenon of correlation which relates the activities of the different mitochondria throughout the body, perhaps putting them in phase with one another, or at least actively coordinating their activities. The connection between *Soma* and breath is greatly significant. This significance becomes more clear in a very precise account of this relationship described in another individual's experience:

"As a rare occurrence I had a lot of deep and very full spontaneous hyperventilating the whole session which seemed to cause refinement of the prana so that breathing *Soma* in the nostrils was experienced in between the inhalation and exhalation of breath."

Breath is the summation of the activity of metabolism of all the cells in the body. We can understand the above experience more clearly if we look at what is happening on the cellular level. When air is taken into the lungs, red blood cells pick up oxygen, and carry it through the blood stream to the cell. Diffusing through the cell membrane, the oxygen molecule reaches the intermembrane space of the mitochondrion. There it is oxidized to  $H_2O$  by the electrons passed across the respiratory chain from NADH. The NADH, now restored to its original form of  $NAD^+$ , returns to play its part in the citric acid cycle, where pyruvate is broken down into  $CO_2$ , while  $NAD^+$  is transformed to NADH. The  $CO_2$  released in the citric acid cycle diffuses out of the cell, and is carried back to the lungs by the hemoglobin in the red blood cells. In the gap between the breathing in of oxygen, and the breathing out of  $CO_2$  is the metabolism of foodstuffs in the citric acid cycle, yielding the energy which structures the proton gradient. If we consider the breath to be the sum of the activities of the different cells, then the inward breath carries oxygen to the cell, enabling the aerobic breakdown of foodstuffs; and the outward breath carries away the carbon dioxide. In between is the creation of a proton gradient from the energy derived from the citric acid cycle. That proton gradient now drives the synthesis of ATP. The proton gradient, which we understand to be Soma, is located experientially in the gap between the inward and outward breaths, when the breathing is very much refined. These graphic descriptions of the connection between breath and Soma, and between prana and Soma, are precise experiential validations of the designation of the proton gradient as Soma.

In opening up the chapter of direct experience of growth of higher states of consciousness, we have launched our boat into a vast uncharted region. A simple concept, that *Soma* is the proton gradient, has now been burdened with enormous complexity: There are levels of experience of Soma, that is different regimes of Soma, and all of the regimes are infinitely correlated with each other. In each regime, the character of *Soma* is distinctly different, but the principles of its expression, the rules of linkage between intelligence and existence on every level share common themes. The linkage between the different levels of expression of *Soma* allows the activity on each level to have ramifications on all the other levels. A vibration on one level must reverberate through all the other levels. If all the different levels of *Soma* are related together in this way, then the knowledge of even one level of *Soma* will reveal profound truths relevant to all the levels: Knowledge of the full details of structure and interaction of the proton gradient will provide an open window into the dynamics of flow of *Soma* on every level of creation. It should therefore



not be a pinch that we have captured only one-eighth of the nature of *Soma* in the understanding of the proton gradient. The detailed knowledge of that one partial value can open up in principle the knowledge of all the other levels—because they are infinitely correlated, that is the activity of all the other levels is embedded in the activity of the proton gradient. Like a tree is contained in the seed, the entire tree of the universe is contained in seed form in every manifest expression of Soma. It only requires that microscopic vision and insight which can visualize the tree in the seed. We have firmly grasped that seed of all creation in the recognition of the proton gradient as the expression of *Soma* on the biochemical level. Experience of the wholeness of life is one level of Soma. But the ramifications of the correlatedness of all the different levels of *Soma* is profound. It makes the knower, the experiencer, into the home of all knowledge. By virtue of infinite correlation, the experiencer can enjoy the benefit of the knowledge of all the different levels of Soma, by enjoying on the level of direct experience the integration of all the functions of consciousness, within his own awareness. The knowledge of the correlation of all the different levels of Soma, provides insight into the mechanics of performance of the TM-Sidhis: How the individual human being, resorting to his own consciousness in the state of Self-referral, can know anything, can do anything, can be the Master of all creation.

The experience of integration of life through the TM-Sidhi program is a direct means to perfect mind-body coordination, and to unfold the full potential of human life on earth. By unfolding in completeness the nature of *Soma* on one level, the total span of creation from smaller than the smallest to bigger than the biggest, and from objective to subjective is profoundly mastered. The individual growing in the awareness of his great status as the Master of all Creation by experiencing and culturing the wholeness of his own consciousness arrives by that path at the master switchboard of all creation. We will conclude this section on the validation of the proton gradient as the representation of *Soma* with an eloquent description of *Soma* in terms of wholeness.

"As the experience continued, silence grew. I felt almost beyond Ved, though there was still a tint of fluctuations detectable. There was still almost no awareness of environment and this enclosure of Self within itself kept deepening until creation collapsed onto me—the Self. It was a phase transition which started with a gradual build up of drawing within as a deep-bubble-like wholeness. The creation collapsed as unmanifest—almost. An outside sound, though loud, was barely heard; it felt very distant yet a fluctuation of Self." L.A. Fairfield, Iowa, 1977,

## VI. Conclusion

We have proposed a biochemical model for the age-old concept of *Soma* from the Rig Veda. We have explored the model in the light of the ancient Vedic text, and in the light of the description of *Soma* by the modern seer of the Vedic tradition, Maharishi Mahesh Yogi. Finally we have touched upon the relationship of our model to the experience of *Soma* by sidhas practicing the TM-Sidhi program. Verification by ancient seers, by modern seers, and by direct experience, present three Eureka's, three independent streams of confirmation of the proposed biochemical model.