

## **The Internal Mystery Plays: The Role and Physiology of the Visual System in Contemplative Practices**

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The eye has fascinated man for millennia. The function of the visual system has been carefully studied for the past century and many previous "mysteries" have been defined, but the function of the visual pathways in their relationship to "mystical experiences" has been enigmatic until recent years, and even today is not fully understood.

This article is designed to elucidate what we know of the physiology of the visual system and how it plays a role in mystical experiences through a scientific review of the literature, a review of religious practices from around the world, and from the author's own personal experiences. Through these, it can be seen that the foundations for all mystical experiences can be found in various aspects of the near-death reflex, which is the ultimate reflex of the "fight-or-flight" mechanism of the autonomic nervous system for fear and stress responses. These reflexes will be discussed in detail, explaining many of the physiological correlates to mystical experiences. The second aspect of these experiences deals with the psychological changes that occur within the individual after having experienced a mystical state, which leads to a transformation in the personal psyche in regard to lifestyle and relationships with others.

Before examining these particular aspects of the transformational process, I will provide some required background information in the physiology of the visual system. In addition, I will present various aspects of the "esoteric" history of ophthalmology and the use of the eye in symbols of world religions that will be helpful in understanding the deep connection between the eye and mystical states.

### **Esoteric History of Ophthalmology and Symbology of the Eye**

The eye has long been held in high regard as a mysterious organ and, therefore, has been associated with the secret mysteries of all the world religions for over five thousand years. The sense of sight was considered more excellent than all the rest of the senses because it did not depend upon contact with or close proximity to the object.

This correlation to the Inner Mysteries was promulgated by the first known Egyptian physician represented in the god Thoth. He has also been called Hermes Trismegistus and was the god of wisdom, medicine, and the moon, who repaired Horus's injuries after his eye was removed by Typhon. It was with Hermes that we find the beginnings of the mystery schools of the ancient world that were used in the training of the physician/priest class as handed down by prehistoric shamanism (Hall 1988).

The eye was also considered analogous to the chemical mercury as the catalyst for transformational change. This symbolism is seen in the Greek name referring to the pupil, *pupilla*, which means "child," or kore, meaning "the young maiden" (Hirschberg 1982). This is due to the reflection seen of one's self when looking in the eye of another, similar

to the reflection of oneself when looking at a small ball of mercury. This is representative of the transformational process in the psyche, not necessarily in the material world.

An additional meaning to the word *kore* in the capitalized version was the equivalent to "*The Maiden*," which refers to Persephone, the daughter of Demeter, the key Goddess to the Inner Mysteries (Kerenyi 1951). Thus, in labeling the pupil as *kore*, Greeks were alluding to one's own eye or the eye of another seeing the "whole truth" by looking for the "Inner Wisdom" in oneself or in others (Frazer 1922).

Another connection of the eye to the religious systems of the Inner Mysteries comes from the word *mystery* itself. The word *mystery*, as well as *mystic* and *mist* consist of a root word, *muein*, which is Greek for "to close the eyes." Thus, the word *mystery* and the initiations surrounding it require a "closing of the eyes" as a cornerstone

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part of the experience -- closing the eyes for prayer, meditation, or other contemplative practices is foundational for discovering the "mysteries" of life (Otto 1955).

Since the transformational process is the equivalent of a "rebirth," the pupil of the eye as a metaphor for the rebirth of the soul has also been associated with the *yonis* of the Hindu religion. The analogy is made to the birth into this life through the *yonis* of the female, while birth into the afterlife passes through the opening of the "Inner" eye.

### **Personal Experience**

Just such a mystical state happened to me spontaneously and without any "known" preparation on my part. At approximately 1:30 A.M., I experienced the sudden onset of severe crushing chest pain over the left side of the chest, which quickly radiated with heat down my left arm and up into my left neck. As a physician, I knew immediately that I was having some form of cardiac ischemia, and as a reflex I put my hand over my chest to feel my pulse. Prior to this episode, I had been awake and watching television, unable to sleep due to personal and professional worries and concerns.

As I felt my heart beating, I attempted to count the pulse but was unable to keep track of it because it was greater than three hundred beats per minute. As I was feeling the pain increase and my breathing start to lessen, I broke out in a severe sweat and seemed paralyzed from doing anything. Thoughts of "What should I do? Should I wake up my wife? Should I call 911?" were racing through my head, but I could not move. I could only feel my heart. Then as I was feeling my pulse and trying to decide what to do, within a few seconds, my heart suddenly stopped beating.

I will never forget that instant when I was waiting and anticipating the next beat to come. . . and it didn't come. . . and it didn't come. . . and it didn't come. . . and it didn't come. A panic rose in me like no fear I had ever had in my entire life, knowing that I was about to die, wondering what was going to happen to my family and my three children (the

youngest of which was under a year old), about what would come of my practice, who would take care of my patients, who would be able to take care of the complex problems that I deal with? All these thoughts were racing through my mind as I tried to decide what I could do and then suddenly, I realized, "What *can* I do. . . I can't move, I'm dying, I'm *dead*." And it was at that moment that I remembered my upbringing, which said: When you are facing death you are to let go and turn everything over to God.

As soon as I had the thought of letting go and releasing myself to the arms of God, there was a sudden release of the pain and the fear and a complete sense of bliss and understanding. And in that moment of understanding, there was a panorama surrounding me, 360 degrees in all directions of three-dimensional technicolor, holographic flashes of everything that occurred in my life, from the most trivial detail to the most important events, all displayed equally and with no favor, connected by golden threads, showing me that everything that had occurred to me in my life was important, was part of who I was, and was essential to who I had been. And in that knowledge was the understanding that my life had been worthwhile and I had nothing to regret in dying. This vision lasted only a half a second, and shortly thereafter, I was being projected down a long, rocky tunnel of grayish-brown, at the end of which was a bright light.

Within a few seconds, this golden white light surrounded and suffused through me, and I opened up into this huge expanse of silvery-white light that was inhabited by a multitude of egg-shaped, silvery, crystalline beings that were slowly bobbing and bouncing around each other with cameo-like faces. As I looked, I realized the faces, although not perfectly clear, were recognizable as everyone I had known, both alive and dead. Standing at the entrance to this expanse was my father, who had been dead for seven years. I felt this great joy and relief to see him because there was so much I wanted to share with him, but all I received from him was a thought in my mind in his voice that said, "Al, would you like to join the dance?" I looked around and I said without speaking, "No, Daddy, but I think I'll watch for a little while." And with that, he retreated into the group and joined the others. I wanted to be with him but made the decision not to join, watching for what might have been a splitsecond but seeming like forever. Then the scene faded.

I awoke to the alarm clock the next morning, in my bed with the television still on, looking around me and realizing that I had not died but was still in the world of the living. At that point I knew that something very significant had happened. I immediately went to my doctor for a physical check-up, was subjected to an electrocardiogram, cardiac enzymes, and a treadmill test, all of which were normal.

This episode, I later learned, was a typical "near-death experience" (NDE). Its impact compelled me to find out what had happened to me both "scientifically" and "rationally," and became the impetus for this article. As mentioned above, the description of how this type of event occurs within the brain requires the knowledge of some basic concepts of neuroanatomy and neurophysiology; then the reflexes involved in the production of these episodes and other altered states of consciousness can be examined. Also, I realized there was a spiritual process at work in this episode, which prompted my looking into various religious, philosophic, anthropological, and psychological sources for this experience.

## **Neurological Foundations**

The neuroanatomy with which we will be concerned is that of the visual system, the brainstem, and the autonomic nervous system, as well as some of their interconnections to other parts of the nervous system which, in the meditative state, will stimulate both visual imagery and the "White Light" experience.

## **Cortical Contributions**

Briefly, the visual system consists of the eyes, which are connected to the

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remainder of the visual system by way of the optic nerves, which travel posteriorly and first synapse in the brain at the lateral geniculate bodies. It is here that there are multiple interconnections to other areas of very ancient parts of the brain, including the medial geniculate bodies, which are concerned with hearing and will be discussed later. Other connections of the lateral geniculate go to various areas of the limbic system and other primitive areas of the brain that mainly deal with the basic reflexes and survival mechanisms of the body (Black 1991). After leaving the lateral geniculate bodies, the information then travels along the visual pathways in the temporal and parietal lobes, ending in the occipital lobe. It is here that formed vision is interpreted, and through areas called the visual association areas immediately in front of the occipital lobes, the information is appropriately interpreted and correct actions can be initiated (Livingstone 1988).

The occipital lobe is the area upon which I will concentrate when I speak of the White Light experience, and the temporal lobe, when concentrating on visual imagery. The images produced by these respective areas of the brain have been well established and known for many years (Foerster 1931; Penfield 1954) and will be used to help describe some of these reflexes.

The most interesting area, the right temporal lobe, was studied in the 1950s by Wilder Penfield (1954) in Montreal with patients undergoing neurosurgery under local anesthesia. In his studies, he stimulated various parts of the brain while the patient was awake and asked the patient to describe the sensations associated with each of the areas stimulated. What Penfield found was that stimulation of the right temporal lobe in the area of the anterior Sylvian fissure led to typical, reproducible images of neardeath states, angels, the Virgin Mary, and other archetypal forms of images with significant physiological and theological aspects attached to them.

Another area of interest from a neuroanatomical standpoint is that of the anterior portion of the brainstem, which is supplied by branches of the basilar artery. It is in this area of the brain that the vital functions of the body are controlled, such as breathing, heart rate, eye movements, balancing, and hearing. These vital areas of the brainstem are the ones deepest within the tissues of the brain and, thus, the most protected, which one would

expect for those areas most involved in survival of the organism. Likewise, the vasculature to these areas are the most sensitive to changes in both blood pressure and oxygenation, as they belong to the basilar arterial system. Our discussion will focus on this system as it relates to the neardeath experience and the associated reactions that occur.

### **Autonomic Contributions**

Another part of the anatomy that is of importance to us in this discussion is the automatic nervous system, comprised of both the sympathetic and parasympathetic nervous systems, which act as the automatic regulatory mechanisms within the body. It is through these systems that the blood pressure, pulse, blood oxygenation, breathing, heart rate, and all other automatic functions necessary for the survival of the organism are regulated and kept in balance. Hence, whenever there is an excess in sympathetic flow, in general, there will be a reflex of parasympathetic flow to balance it. For instance, when the blood pressure goes up for any reason due to a stimulus within the sympathetic nervous system, a parasympathetic rebound will occur through certain reflex arcs. However, there are certain conditions that override this automatic reflex and that can cause a "disconnection" between the two sides of the autonomic nervous system and can lead to profound, if not fatal, results. It is these sorts of disconnections that I will be discussing as to their relationship to the neardeath experience.

The sympathetic and parasympathetic systems act in "balancing" the stresses that assail the physical body, both externally and internally. These signals are carried into a very primitive part of the brain called the locus coeruleus, either by direct signals (Miller 1985) or by circulating peptides (Myers 1969). From there, the appropriate response is then carried out by either the sympathetic or parasympathetic side of the autonomic system. The locus coeruleus is most sensitive to physiological changes and is the area of the brain that appears to be most involved in near-death experiences and the meditation of the reflexes that occur. The locus coeruleus, in turn, stimulates the hypothalamus, which is the area of the ancient reptilian brain that controls pain, sexual response, hunger, thirst, and all of the major hormonal systems of the body.

### **Vascular Contributions**

The basilar artery is unique in that it is a single artery that is formed from two arteries, the vertebral arteries, which course superiorly from the spinal column into the back of the neck. It is at the base of the brain that these two arteries fuse to form a singular basilar artery, which then courses from the neck up into an area behind the eyes and in between the ears where it bifurcates into the two posterior cerebral arteries. The posterior cerebral arteries are very important in our discussion because they are the major blood supply to the occipital

lobes and to the geniculate bodies, the lateral half of the lateral thalamus, the posterior limb of the internal capsule, and the optic tracts.

### **Psychological Contributions**

Many of these events are enhanced during certain psychological states of mind, such as when there is extreme fear or panic, and by other forms of marked stimulation to the sympathetic nervous system. During these times, it appears that selected reflex loops are stimulated through the amygdala and limbic system to retrieve temporal lobe memories as templates to match the perceived danger within the environment. This is an archetypal protective mechanism that automatically comes into play whenever the sympathetic nervous system is stimulated in a "fight-or-flight" response (Cannon 1927). These archetypal memories are those that have been genetically saved throughout hundreds of generations of human and probably earlier evolutionary life that have enabled mankind to survive and flourish. Thus, with increasing sympathetic stimulation, there is an enhancement of these archetypal survival images that can then be variously interpreted as mystical images, reincarnations, channeling, or other paranormal and equally theological phenomenon (Reichel-Dolmatoff 1972).

Conversely, when there is an excessive stimulation of the parasympathetic nervous system, which can also occur in darkness, a vasodilation of the peripheral circulatory system occurs, leading to a slow decrease in blood flow to the cerebral cortex. When this occurs, the areas most sensitive to decreased blood flow and decreased oxygenation are those areas called "watershed" areas at the end of capillary beds. These areas occur where the capillary beds of one major artery comes in contact with the capillary beds of another artery, such as those seen in the occipital lobe and brainstem. The occipital pole, which serves central visual acuity, is one of the most common areas involved in cerebral vascular accidents of the watershed type. Typical loss of blood flow to this area leads to a condition known as a *cortical release phenomenon* (Brust and Behrens 1977), with the generation of a large, white light in the central portion of the vision (Foerster 1931). As this white light extends, it increases to involve the entire occipital cortex and, thus, the entire visual field.

This is what occurs in profound mystical states such as those seen in Zen Buddhism and Hinduism, where profound relaxation (i.e., parasympathetic overload) occurs with marked peripheral vasodilation (Guyton 1991), leading to cortical ischemia of the type described above. This has also been called "Nirvana," "Samadhi," or "Union With God." The latter metaphor is prevalent in Catholic mysticism such as that described by St. John of the Cross and St. Teresa of Avila (Pears 1972). Also, the sudden loss of blood pressure to the brain that elicits this phenomenon is basic to the neardeath experience and the commonality of vascular collapse seen in those patients (Morse 1990).

### **Theoretical Model for Near-Death and Mystical Imagery**

The most common form of this reflex is the over-stimulation of the sympathetic arc, followed by a reflexive response of the parasympathetic arc that occurs with emotional

and physiological stress in the form of blushing and fainting. In both of these conditions, a physiological/emotional stimulus causes a sudden increase in sympathetic stimulation, resulting in a reflexive parasympathetic stimulation that leads to vasodilation of the skin (i.e., blushing) or a profound vasodilation periphery, leading to complete vascular collapse (i.e., fainting). However, when it occurs in certain physiological states, such as in meditations or while lying horizontally with a vascular collapse, then the stimulus can be prolonged and, in some cases, remembered, thus leading to reports of neardeath states, vision of angels, dancing with elves, or other "hallucinations." The remembering of these states is enhanced through meditation by a purposeful increase in parasympathetic tone for relaxation to counter the physiologically and physically painful stimuli that increasingly drive the sympathetic nervous system and these images. Hence, in eliciting trance and near-death states, the advanced meditators may be causing ischemia to these vital cortical areas, with possible permanent damage. These damaged neurons will become supersensitive and, thus, enhance the reflex when reelicited (Walters 1991). This is a paradoxical relationship within the autonomic system in that ischemia to the locus coeruleus that elicits the neardeath state makes it easier to cause more ischemia to the same area, thus facilitating the response.

Why do these reflexes cause people to feel as if they are "suffused with light" as the White Light experience is occurring? This, I think, can be explained by the various physiological aspects that are occurring at the same time as the White Light experience. When this light occurs, there is a profound and sudden decrease in peripheral vascular resistance due to the excessive parasympathetic stimulus (Jevning 1978). This sudden release in vascular resistance will cause a very rapid increase in blood flow throughout the entire body, beginning centrally and moving to the extremities. This gives a sensation of energy, or "light," being transmitted through the body. Along with this decrease in peripheral vascular resistance there is also a profound relaxation of the skeletal muscles due to this parasympathetic stimulus, which also adds to the feeling of "something" flowing through the body. After years of practice, members of certain Buddhist sects can raise their skin temperature through this mechanism (Benson 1982), showing one instance of where conscious mind can control autonomic functions.

The parasympathetic stimulus, when occurring suddenly and in a very overstimulated state, initiates the release of the peripheral vascular resistance and muscle tone, causing the blood to suddenly flow into the extremities, thus depriving the cerebral cortex of additional blood flow. So as the White Light develops, blood is being shunted away from the occipital lobe, thus enhancing the White Light and simultaneously increasing blood flow to the ex-

trémities in such a rapid fashion that an actual tactile sensation of "energy" flowing through the body is realized. This is also accompanied by a profound release of B-endorphins and other neuropeptides that will induce an "ecstatic" state. This profound parasympathetic state also leads to marked relaxation of the entire body, a state which

can only be achieved in deep sleep, Stage IV anesthesia, death, or certain contemplative states.

Conversely, stimulation of the sympathetic nervous system leads to an increase in visual imagery, such as that seen in images of the Virgin Mary, the Pantheon of Gods and Goddess, angels, elves, fairies, ghosts, and so on, due to a release of the memories in the right temporal lobe and mediated through the amygdala and limbic system as part of the "flight-or-fight" mechanism, as previously noted. When this excessive sympathetic state occurs, the visual imagery can be quite vivid, thus leading, on some occasions, to the generation of a White Light experience at the end of a very stressful and significant period of sympathetic overload with parasympathetic rebound.

The near-death experience begins with an air hunger, which causes extreme fear and panic, with a feeling that death is imminent. There is maximal stress placed on the nervous system with the "awareness" of the stress being controlled by the sympathetic branch of the autonomic nervous system. These responses are mediated by certain areas of the brain that evolutionarily are millions of years old and are responsible for homeostasis in the body. When stress is at its maximum level, the conscious mind, the cortex, develops a diminishing flow of blood. When the brain senses that it is still becoming ischemic despite maximal sympathetic output, there develops a protective parasympathetic response called an atrioventricular block, where the heart suddenly stops beating for eight to fifteen seconds, followed by a very slow pulse that only circulates blood to the heart, lungs, and brainstem, via the basilar artery (Guyton 1966). There is a marked total loss of reflexes, with no detectible peripheral pulse. During those seconds when the heart stops, the blood drains from the cortex, beginning with the frontal lobes, anteriorly, and proceeding to the occipital lobes, posteriorly, causing cortical release phenomena as each area becomes ischemic. As mentioned above, cortical release phenomena are the sudden, complete discharge of all memories in the particular area of the brain experiencing lack of blood. Over a period of minutes, the extremities begin to cool and mimic true death. This state of enstasis may last from hours to days, with occasional spontaneous recoveries.

Because most people die while lying on their backs, gravity plays a role in the temporal course of the experience, with the first areas losing their circulation being the frontal lobes. The frontal lobes are associated with certain memories and violent behavior. Hence, as this area of cortex undergoes ischemia, a release of these images occurs that corresponds to the "life flash" described in reports of neardeath.

This is quickly followed by a feeling of remorse and pain over all the harm done to others during life. The only escape from this pain is found in acceptance of the harm done and a surrender to the process of death as being beyond the personal will and control. When one refuses to accept and surrender to the process, one is forced to remain "stuck" at this stage until there is surrender, or the person regains total consciousness. If they "come back" without surrendering, this correlates to the innumerable reports of "hellfire and brimstone" that inspired Dante's description of hell in *The Divine Comedy* after his own near-death experience at age thirtyeight (Zaleski 1987).



After surrendering to a Higher Authority, there is typically the "positive" experience of the life flash, followed by a journey through a tunnel toward a clear White Light, described as the entrance into the "other world" in every culture and religion known to humankind. Finally, the individual is met at the entrance by an entity that has been variously identified as God, Yahweh, Jesus, Mother Mary, various angels, saints, *devas*, or other spiritual beings. At some point after arriving at the "other side," the experient is offered an invitation to stay.

A tunneling effect occurs as the blood drains from the parietal lobes and causes ischemia of the optic radiations. As the blood eventually drains from the occipital lobes, a brilliant white light is generated, known as a phosphene (Foerster 1931; Brust and Behrens 1977). Simultaneously, there is a massive outpouring of beta-endorphins and other neuropeptides to alleviate the pain of death, which elicit the well-known "high" that correlates to the feelings of bliss (Smith and Nemeroff 1988). After the blood has drained from the cortex, the remaining circulatory pressure is shunted into the circulation of the basilar artery, providing circulation to certain areas of the cortex as a result of evolution's extension into those areas that are related to the persistence of visual, auditory, and memory functions during the near-death state (Miller 1982).

### **Contributions by the Visual and Oculomotor Systems**

There are several normal reflexes that occur in the visual system that need discussing in some detail for a better understanding of mystical visions (Lessell 1975). The main part of this section concerns the physiology of the visual system and certain entopic conditions (Duane et al. 1987). These entopic phenomena due to the lack of sensory input are the major determining factors in the visual experience of altered states of consciousness.

Eye closure (Schmitt 1955), darkness (Eliade 1958, Munn 1972), and isolation (Newmann 1968, Eliade 1972) are all common factors to the esoteric practices of most of the world's religions, and physiologically, these factors can now be shown to be beneficial to the elicitation of mystical states of mind. It has been known that darkness enhances image formation since Asclepides of Bithynia (c. 124 B.C.E.) ordered his patients with hallucinations out of the cellars and into the daylight as a form of treatment (McHenry 1969). Also, darkness metaphorically represents the darkness that

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is the third stage in the near-death experience (Ring 1980; Grey 1985; Zaleski 1987).

During darkness, the visual association areas of the brain, and specifically the occipital and temporal lobes, become supersensitive during visual deprivation. After approximately thirty minutes of total dark adaptation, both the retina of the eye and the occipital cortex of the brain begin having spontaneous discharges of activity due to a lack of external stimulation, which are seen as various lights, phosphenes, and visual phenomena that can be perceived and characterized verbally (Lessell 1975; Duane and

Jaeger 1987; Miller 1985). They are seen as lines, curves, circles, and occasionally as complex structures, such as oscillating pinwheels, or firework-type patterns, which have been variously interpreted through the centuries as the "Rose," "Lotus," "Carnation," and "Burning Bush," as well as other floral references throughout the world's religions (Jung 1953). However, because of their unique nature of being internally generated, they have been interpreted in numerous ways by saints, mystics, seers, and philosophers throughout the course of history.

One aspect of eye closure for contemplative practices that is sometimes mentioned, but that I feel is underemphasized, is that of bringing the eyes in convergence (i.e., "crossing your eyes" or looking at your nose) during these exercises, which drives the meditative process to a more rapid induction into the trance state and is usually described as looking at the "third eye" (Rouselle 1960). This occurs through a neurological mechanism known as the "oculo-cardiac reflex" (Duane and Jaeger 1990). This reflex occurs when the muscles surrounding the eyeballs are placed in tension or there is pressure placed on the globes, and this stimulates the parasympathetic nervous system through the vagus nerve to slow the heart rate (Arnold et al. 1991). This reflex is commonly seen in eye surgery when the extra-ocular muscles are stimulated. It is exactly these two muscles, the medial recti muscles, that are over-stimulated in crossing the eyes, and this is mediated through the parasympathetic nervous system (Miller 1985).

Thus, crossing the eyes is not only a result of stimulation of the parasympathetic nervous system but of itself will further stimulate the parasympathetic nervous system to slow the heart rate. Forcibly crossing the eyes through closed eyelids while meditating will stimulate this reflex to its maximum and thus facilitate the stimulation of the parasympathetic nervous system. Another aspect of forceful accommodation is that in doing so, the effort places one's concentration on the act of crossing the eyes and thus helps quiet the mind to outside activities as well as to internal "noise."

### **Contributions of Other Neural Pathways**

As previously mentioned, other forms of stress to the body can also add or subtract to these reflexes. The temperature that the body experiences can lead to profound states of mystical experience when brought to an extreme, as seen in hyperthermia and hypothermia (Fay 1959). Cold has played an important role in the internal mysteries in that many of the ancient practices included the placing of the initiate in a cold environment, such as in the underground pits of Eleusis, in caves or on mountain tops, as practiced in the Himalayas. Excessive cold will cause a decrease in the temperature of the anterior hypothalamus, causing a secondary sympathetic stimulation and vasoconstriction of the peripheral blood vessels to preserve body heat. Thus, this decrease in body temperature can add to the overall sympathetic stimulus, inducing the reflex parasympathetic response and increasing its effect on the imaging process.

Similar to visualization is the aural isolation that occurs with these practices in the form of chanting (Glueck and Stoebel 1984) or rhythmic sounds, such as shamanic drumming. These monotonous sounds isolate the hearing to also allow cortical release phenomena of

sound. As the trance reaction develops, it is common to have a "rushing sound" in the ears (Harner 1972), similar to the sound of the ocean, preceding the sound of a "tinkling of bells." This is followed by musical arrays that are unique and sometimes cacophonous, sounding very much like a Buddhist band. It has been shown through electroencephalographic tracings that these monotonous sounds, when given to naive subjects over extended periods of time (i.e., greater than fifteen minutes), can induce marked theta synchronicity across the cerebral cortex (Maxfield 1991), which is the hallmark of meditative state of mind (Kasamatsu and Hiri 1969).

In these isolated states of mind, including sleep, meditation, and panic situations, the gain of the parasympathetic nervous system is increased to help pick up more information about the potential threat and to facilitate the spread of that information to more areas of the brain for interpretation. It is during these states of isolation that the lower brainstem centers take over because there is no cortical sensory input coming into the system, that is, normal vision and hearing.

This amplifying gain in the sympathetic nervous system increases and takes any information obtained, applying it to its memories through a temporal spreading of information that allows the brain to act as a comparator (Livingstone 1988; McClurkin et al. 1991), so that, when someone is in a meditative trance while listening to shamanic drumming that is beating at a constant rate, after a period of ten to fifteen minutes or sometimes sooner, many overtones are heard due to increasingly finer discrimination attempts by the brain to identify differences from one tone to the next. Occasionally, this leads to perceptions of hearing songs or voices and, more commonly, changes in tempo (Maxfield 1991).

Likewise, in the visual system, the phosphenes that are spontaneously generated within the retina due to dark adaptation, micro-saccades, and other forms of retinal stimulation, get multiply integrated by numerous areas to try to interpret the shapes it is perceiving (Livingstone 1988). The way the brain uses these images and compares them in the form of shape and form recognition may likely be following

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the chaotic theory of fractal development. Hence, over time, the visual images will grow in chaotically and distinctly different shapes based on differences in the integrated circuits stimulated for that particular event. Basic figures of lines and circles will get deformed naturally over time with various appendages, which then take on the apparent shapes of people, things, and monsters. This, in conjunction with the same fractal interpretation of sound, could lead to a cacophony of various frightening images and/or massively soothing ones that appear to be unnatural and thus are ascribed to as being "spiritual."

### **Correlates to Contemplative Practices**

Rebirthing and holotropic breathing both utilize hyperventilation techniques to induce first a trance state and, eventually, near-death states. With hyperventilation, there is decrease in the amount of carbon dioxide going to the brain, which acts as a chemoreceptor messenger to decrease bloodflow to the brain to allow carbon dioxide to increase to normal levels. However, after only a few minutes of hyperventilation, there is a paradoxical stabilization of the lowered carbon dioxide levels that is maintained even with normal breathing. Hyperventilation is well known to induce both theta (Kellaway 1979) and delta (Kooi et al. 1964) waves, which are associated with meditative states.

Over a period of time, this can lead to a "pseudo-angina" syndrome with chest pain, shortness of breath, and other typical myocardial infarction symptoms. This leads to tachycardia and eventual disconnection in the autonomic nervous system with a (usually sudden) decrease in the pulse rate due to the profound reflex vagal stimulation to the heart. Sudden cardiac standstill ensues, which can last up to twenty seconds before a profound bradycardia in the range of thirty to forty beats per minute occurs. This, I believe, is the physiological basis for my own near-death experience.

Another area of corollary interest is that of psychopharmacology. We have known for many years that certain plant substances can induce these states of mind, and recent ethnobotanical research has corroborated that these substances do elicit near-death states and transformational processes in the partakers of these substances. Unfortunately, research in these areas is extremely limited due to the recreational abuse of these products. Certain of these chemicals are extremely interesting from a psychotherapeutic point of view and should be reconsidered for research because of their selective actions to certain aspects of the brain, as well as their known effects to induce feelings of love, selflessness, or Hegel's "heroic charity" (Masson-Oursel 1955) that are the hallmark of the "wounded healer," shaman, or saint (James 1982). Among these would be di-methyl-tryptamine (DMT), lysergic acid diethylamide (LSD), harmaline, other beta-carbolines, ibogaine, tetra-hydro-cannabinol, and MDMA. All of these substances have empathogenic and/or entheogenic properties, unlike other restricted chemicals. I believe their classification with other narcotics and other controlled medications should be reevaluated.

Historically, these substances have been used throughout the world to induce states of the "Inner Mysteries," including the Eleusian mysteries, where the barley drinks of the initiates most likely had ergot rust contamination, containing a congener to both LSD and DMT (Wasson et al. 1978). Likewise, harmaline, a monoamine oxidase inhibitor, is found in giant Syrian rue, which has been most recently implicated as the *soma* of the ancient Hindi, whose priest class, the Brahmin, routinely "passed a little betel nut" around the table after every dinner, even into the modern era (Jacolloit 1884). Monoamine oxidase (MAO) inhibitors are also seen in the communal drink, "Ayahuasca," of the Amazonian basin, which contains indol alkaloids, mainly DMT (McKenna 1990). Other near-death states have been described in other cultures, such as the mushroom cults of Central America and the Amanita users of the Arctic Circle. All of these must be considered for research to look for a safe and effective empathogen for use in

psychotherapy, thus establishing a safe, chemical way for eliciting a transformational process (Pinkson 1990).

Other environmental factors, such as fasting and dehydration, have been known worldwide as an ascetic practice that would lead to these altered states of mind. First, dehydration, with its decreased blood volume, will lead to decreased blood flow leading to a relative state of cerebral hypoxia, thus sensitizing the person to these states of mind. Secondly, in severe fasting, as hypoglycemia occurs in the brain, there is a sense of ensuing death; this fear of death alone can have sufficient sympathetic stimulation to stimulate the survival-maintaining images of the right temporal lobe (Conn 1947; Spillane 1947). However, there comes a stage in the recognition of these images when no images exist that are familiar to the working state of mind. It is at this juncture that the separation of the soul from the body occurs, and there is a realization that there is a level of experience beyond what we have in day-today life.

Temperature can also play a major role in eliciting these states of mind. Hallucinations are well known to occur in fevered conditions (Watson 1848), as well as in profound hypothermia. Actual physical positions can also assist in the production of these states of consciousness since head erect positions (i.e., standing or sitting stiffly) would enhance the decrease of bloodflow due to gravity's effect. Also, locking the legs in various sitting positions will decrease blood flow to the heart and increase peripheral edema in these extremities, thus further decreasing circulation to the cerebral cortex. An excellent review of trance postures and their physiologic correlates has been recently published and is highly recommended (Goodman 1990).

Other forms of ascetic practices, such as mutilation and sacrifice, have similar reflex stimulation to the sympathetic nervous system. Any painful stimulation on the body surface usually evokes a vasopressor response in the body through the vasomotor areas in the medulla; thus, the pain of these

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practices will increase sympathetic stimulation and become additive to any other sympathetic stimuli occurring simultaneously in the body.

With contemplative practices, a balance of these parasympathetic states are *consciously* waged against the sympathetic stimuli that are entering the physical body. The goal of such practices is to maintain a high state of alertness while simultaneously maintaining as much relaxation as possible in response to the stimuli, such that the sympathetic nervous system and parasympathetic nervous system are both simultaneously and maximally stimulated. With experience, the practitioner of these rituals will gain the ability to withstand extremes of stress to the physical body, psyche, and spirit through the control of these stressors, while developing relaxation techniques to reach altered states of consciousness. So as this balance is upset, the increase in the parasympathetic nervous system tone will lead to increasing levels of controlled cerebral ischemia, leading to the visual imagery and various Light experiences.

Many of these conditions are related to actual stresses on the physical body or perceived threats to the physical body. Physical stress, such as that seen in the Ghost Dance of the North American Indians, or the psychological stress of knowing that one is about to die, can be of sufficient magnitude to stimulate the appropriate reflexes and begin the cascade of events that leads to a near-death experience and the ability to elicit the aid of the entities of the "other world" (Eliade 1958; Walsh 1990). This is the key to the mystical process and to the rebirth of the soul and the individual.

Over many years of meditative practice the great healers have been able to heighten their sensitivities to the point of reaching levels of autonomic quietude, with maximal gain of the sympathetic system, such that the brain feels that the only other state it remembers and identifies with is near-death state. It is at this point of meditative practice that the adept has the spontaneous near-death experience due to the paradoxical feeling in consciousness that there is a total disconnection between the sympathetic and the parasympathetic sides of the autonomic nervous system and, therefore, loss of control of the physical body -- hence the shamanic death and rebirth.

### **Transformational Psychology**

However, there are two aspects of the experience that cannot be fully explained physiologically and require delving into physical and spiritual realms. One aspect is the initiation of the near-death reflex. The reflex itself appears to be a paradoxical disconnection between the sympathetic and parasympathetic nervous systems, with vascular shunting away from the cortex with relative preservation of oxygenation to the brainstem and memory centers of the temporal lobes. This would account for the marked amount of catalepsy that occurs in the physical body while vivid imagery is simultaneously playing within the conscious mind. But not everyone who has syncope or a cardiac arrest has a neardeath experience with typical features of entering a tunnel, seeing a white Light, and visiting with spiritual beings.

The first psychical aspect that must be considered is the amount of fear or stress that the person is having at the time of the near-death experience. There has now been enough significant research done in shamanic journeying and near-death experiences to realize that there needs to be an actual fear that one is losing one's physical body and actually dying before the neardeath experience will manifest. This would seem appropriate as a protective mechanism to an animal in the jaws of a predator, who then reflexively collapses to avoid the pain of death. The feeling of "ecstatic rapture" that occurs is most likely mediated by certain chemoreceptors, such as beta-endorphins, as has been suggested by Candice Pert (Dossey 1989), and is identical to the "runner's high" or any other physical stress that will produce a reflex endorphin surge in response to pain. Further research in this area is needed.

This state is also seen in lower animals and man as the "dive" reflex. In certain psychological experiments, laboratory animals have been placed into a pool of water that has no egress; after a period of frustrated swimming, the animal will dive to the bottom of the pool and die. On autopsy, there is no evidence of drowning but only that the heart

stopped suddenly of an atrio-ventricular block. However, if the animal is rescued as the dive reflex is occurring and resuscitated, the animal can be put back into the pool and it will then swim for three to five times longer. This indicates that the animal has learned the concept of "hope" of rescue, and that there is "faith" in a higher power that it will not have to dive to the bottom and die.

This leads to the second aspect of the near-death experience that I feel is essential for the transformational aspect of the psyche: not only realizing that the physical body is dying but then consciously releasing the physical body from the personal will through the sudden acceptance of a Higher Authority. It is this subjugation of will that is the common feature of almost all persons who have had near-death experiences and have then had a transformation in their psyche in the way they live in the physical world.

This tends to follow the teachings of all the major religions of the world, all of which have stemmed from shamanic practices of stimulating neardeath experiences to make the shaman a "wounded healer" (Achterberg 1988). It is this "willingness" to guide the physical body through these experiences that allows the mystic to reach levels of understanding and compassion that could not otherwise be obtained. Thus, the use of shamanic rituals and near-death states, if they can be safely induced, will lead to empathetic transformations within the individual psyche (Walsh 1990).

All humankind faces the ultimate reality of death of the physical body; with that realization comes the attendant fear that the conscious mind may cease to exist as well. All the religions of the world have developed in response to that fear, to help explain the death-rebirth process, which is fully and best experienced in a near-death state. In looking at the foundations of known religious sects, both primitive and modern, both Eastern and West-

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ern, a near-death experience as metaphor for the death-rebirth process is found, usually ascribed to the titular founder of each particular religion or tradition. The near-death experience promotes a sense of peace and love for both self and others, and develops a sometimes "pathological" altruism, with the "pathological" descriptive being the present-day scientific, Freudian view of religiously ecstatic states. Throughout history, however, these "ecstasies" have been tolerated because they tend to produce leaders the like of Moses, Jesus, Buddha, and Mohammed. We are now learning that this altruism is not pathological but healing to the individual who is affected, as well as healing to the society in which that person lives.

These experiences are varied but follow the general motif of death and rebirth as seen in the various mythologies of all known human cultures (Campbell 1949; Eliade 1958; MassonOursel 1955). The visions are interpreted by the religions of the world as *a presence of god, ecstasy, rapture, heaven*, and all the other terms assigned to those feelings of bliss that are present during the experience. We find multiple examples of this experience in the Torah. Moses' vision of the burning bush is typical of the descriptions

of the White Light phenomenon, with the revelation of the Commandments representing a cultural interpretation of moral tenets governing relationships with others that are deeply felt in a near-death state. Other well-known examples include Jonah in the belly of the whale, Ezekiel's vision of the chariot of God, and Jacob's experience with the ladder to heaven. Likewise, the archetypal, anthropomorphic images encountered during this nonordinary state of consciousness have been interpreted to be the mythological and theological heroes of all human cultures and societies as mentioned above (Campbell 1949; Jung 1968; Jung 1970; Zaleski 1987).

Recent research has shown that people who have this experience call themselves "spiritual" rather than "religious," believe in an essential underlying unity of all religions, desire a universal religion embracing all humanity, feel inwardly close to God, and have a conviction of life after death (Ring 1985). All of these changes occur in the individual from a singular experience that sometimes lasts only a few minutes. Also, there is engendered a feeling of selflessness and generativity that puts the welfare of the community above self (Morse 1990; Ring 1985).

I am constantly asking myself why this experience is accompanied by such a profound feeling of Spirit. The only answer that I can give at present is the one that I have received from the experience itself, and is the same answer given by all known religious Masters. The answer comes in a love that is so profound, deep, and unifying that it seems that it can only come from a Universal Presence, and from nowhere else. Hopefully, more of the answers to what anatomical and physiological substrates are involved in this feeling of motherly/sisterly love will be forthcoming in the next few years, with the accessibility of magnetic resonance imaging and angiography, Doppler, PET, and other non-invasive procedures that can more accurately define the in vivo neurophysiology of the experient in induced near-death experiences (Pahnke 1969; Richards et al. 1972).

A near-death experience can occur when the physical body is close to physiological death, whether by injury or illness, or elicited through esoteric practices that mimic and/or induce the near-death state. The individuals who are traditionally chosen as healers in historical and modern animistic societies have usually had a spontaneous near-death experience (Achterberg 1988; Eliade 1972; Harner 1980; Walsh 1990). That tradition is preserved in the Hasidic communities of eighteenth-century eastern Europe in the Shivhei ha-Besht, which contains the declaration that "in earlier days when people revived after lying in a coma close to death, they used to tell about the awesome things they had seen in the upper world" (Zaleski 1987). The numerous techniques of achieving ecstasy that have developed over the past fifty millennia are distinctive, separate, and equally capable paths to that same, singular goal of an "asexual rebirth" into the same physical body found in the near-death experience (Eliade 1969; Eliade 1972; James 1982). This rebirth, in some cases, has been metaphorically referred to as "virginal," as seen in the stories of the Jesus, Buddha, the Hindu's Shiva, the Sumerian's Mwuetsi, and the Egyptian's Osiris, to name a few (Campbell 1949). With that rebirth comes the inherent understanding of the intricate interrelatedness of all life and its unitive nature with the Creative Spirit of ultimate reality.



The shamans of all known primitive religions, also known as mystics, saints, prophets, and sages, are aware of this healing power and have been utilizing near-death experiences for initiation and healing for over fifty thousand years, according to aboriginal oral histories and supported by anthropological evidence. Each culture has taken basic contemplative practices and has added features that are/were pertinent to the environment and heritage of the culture to make the religious rituals and practices acceptable to the populace. In Judaism, this process was codified in Mosaic Law after the tribes of Israel had come together from following their pagan, nomadic beginnings. The oral histories that could be remembered back to a time that we now label as almost fiftyeight centuries ago became the foundation of Judaism's most sacred texts. Moses was the chief shaman of the nation of Israel, who described his experience with God as a burning bush and returned with the Commandments, which are identical to the altruistic precepts that have ruled most moral societies. The same is true of Buddha's precepts, the Hindu laws of Manu, the teachings of Jesus and Mohammed, and so on, where the religious sage has undergone some spontaneous or induced near-death experience and returns to tell of the altruistic feelings of sibling-like love that are essential to the ethics and morality of any successful culture or race. These moral rules of "fair play" are inherent in the unitive feelings experienced in the neardeath state.

I have explored many of these paths, from Kaballism to Buddhism, from shamanism to yoga, and have found the "Tunnel and the Light" at the end of each one, when the instructions of the esoteric masters of that individual practice are followed. I have found that there are many common features to the methods I have tried and read about (Eliade 1969; Eliade 1972; Goodman 1990; Jevning 1978). Valid paths include all paths that lead to that point of Unity with Soul that we each yearn for with each waking, conscious breath. And in reaching that point of "knowing" the Ultimate Reality, we can then walk in that Fullness of the Absolute on a dally basis. Although this subjective state of objective reality may vary among people due to cultural differences, I have found that each and every practice has the control of body, breath, and mind as the absolute cornerstone for attaining Oneness with Spirit, with the mythology of the society prescribing the guided imagery of each theologically distinct path, showing the direction of the hero's journey through the Jungian archetypes to that alchemical marriage, the hieros gamos, Death with its Virginal Rebirth (Jung 1969; Jung 1970). But despite the labels, rituals, and prejudicial thoughts of "closer to God than thou," all religious practices find themselves trying to explain the final transition of life, and they have done so through their individual, serendipitous discoveries about death in both spontaneous and induced near-death experiences.

Whether the metaphor be a White Light, a Burning Bush, a Night Journey, or the Cities of Heaven, these experiences are identical with the unitive state found in the final stage of the near-death experience. It matters not if it occurs after forty years in a desert and a trek up a mountain, spending three years alone in a cave, or fasting for forty days and forty nights, the final common path is the same. In the end, we each have to face that moment of transition to the next plane of existence isolated and alone. The more we know of it, the easier it is to cope with the everyday stresses of life. In that is a healing--spiritually, psychologically, and physically--for the individual. For once you learn how to die, you

may then be able to fully live.

To bring ourselves to the threshold of that final common path requires the simplest of techniques of isolating our minds and bodies from the outside world and inducing a feeling of isolation that most closely resembles what we imagine the aloneness of death will be like. And after we have passed through the fearful aspects of the first stage of inner awareness, we ultimately realize that death is not aloneness, but unity with all life itself.

The "White Light" and the imagery reported in contemplative practices appears to be a complex system of reflexes that mediate ischemia to the cerebral cortex stimulating "release" of the occipital poles and the rostral midbrain to discharge these images in any profound state of cellular agony. These vascular events are mediated by way of the autonomic nervous system, either accidentally or purposefully, thus acquiring a "near-death" experience. Understanding the mechanism of the reflexes has taken many years and thousands of researchers to elucidate. In spite of these discoveries and those yet to come, no one will ever fully know why these reflexes and the sensations associated with them exist, or why they cause such profound psychic, physical, and spiritual changes in the individuals who have them. At this point, I can only be humbled by the process that has brought me to the paradigm I have described. I only know that most of the connections and correlations expressed in this article were the product of some of those methods mentioned herein; therefore, I cannot, and will not, take credit for that portion provided by the Guiding Spirit. Thus, the "internal mysteries" of the brain will always hide the Inner Mysteries, although the heart will always have a way of finding the right answers.

We have become the Uroboric serpent (the serpent that eats its tail, see Jung 1968), in that we have returned to the ancient Egyptians' way of considering the eye as the seat of the soul and the doorway into the Inner Mysteries of the religious experience. Now, we find that in many ways they were correct in believing that the eye, through its physiology, is another key to understanding these Inner Mysteries.

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