

**A Proposed Spiritual Axis of the Bodymind
How the Reticular Activating System (RAS), Vagus Nerve and
the Alta Major Chakra Axis May Be the Nexus of
Bodymind/Spirit Consciousness**

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MASTER OF THEOLOGY

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Tiffany Jean Barsotti

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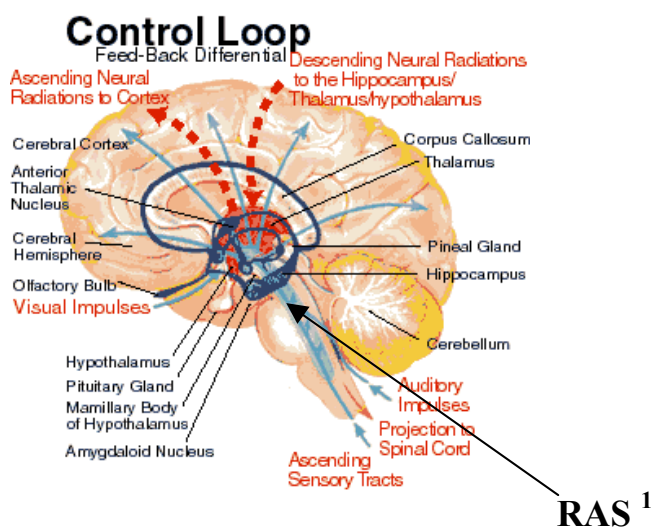
ABSTRACT

A Proposed Spiritual Axis of the Bodymind: How the Reticular Activating System (RAS), Vagus Nerve and the Alta Major Chakra May Be the Nexus of Bodymind/Spirit Consciousness

There are many important axes in human anatomy. Such as: Hypothalamus-Pituitary-Adrenal (HPA) Axis, the Liver-Stomach-Intestines (known as the Liver Triad Axis), Brain-Gut Axis are among a few well-known interactive system axes. This thesis will outline why we should consider adding another.

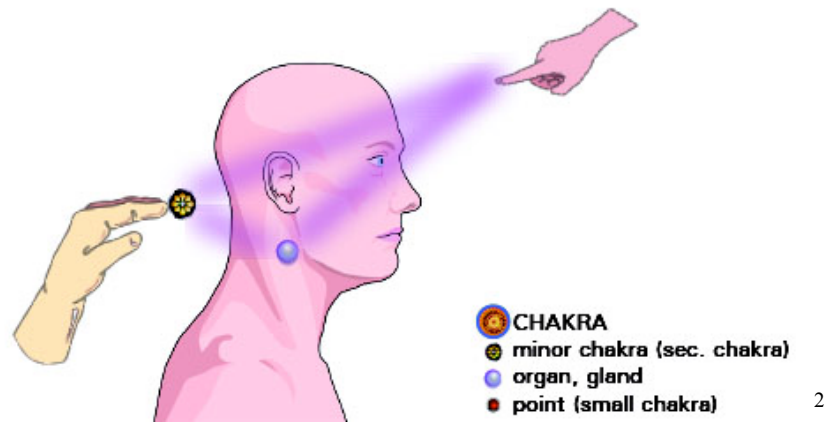
Since its discovery over 50 years ago, the RAS, in the reticular formation of the brainstem, has been studied extensively. The RAS, acting in concert with the vagus nerve (CN-X) (the most important nerve in the ANS), directs and modulates functions throughout the body to maintain a dynamic balance - both with respect to the external environment and the body's internal environment. Less well known to Western medical scientists is a parallel system that can develop in the subtle energy body of the human being. This energy body, while not visible with our current technology, has been known in the ancient esoteric healing traditions. A growing body of significant evidence of the subtle energy body's characteristics is developing among a small group of Western scientists. According to the esoteric teachings, as the human being develops from a state of alert consciousness toward a condition of Spiritually Aware Consciousness, after activation of the Alta Major Chakra at some point, the locus of control over the functions of the bodies (physical and subtle) must shift from the brain to Higher Mind.

This thesis proposes the RAS-Vagus Nerve-Alta Major Chakra Axis as the nexus of communication from Higher Consciousness to the physical and subtle energy bodies of the human being.



¹ Image courtesy of: <http://newideas.net/adhd/neurology>: Section on: Reticular Activating System and ADHD

Neuroscience frames the Reticular Formation (RF) (*reticulum* Latin for "net like") as the gateway to conscious awareness. The RF contains the Reticular Activating System (RAS). With its function as the afferent and efferent cholinergic conduit the RAS activates an alert status throughout the brain. The RAS is said to be the gas pedal that ignites the diencephalon (the hypothalamus and thalamus) as well as the cortical areas of the brain. Functional Magnetic Resonance Images (fMRI) have given us the view or neural maps of what brain cortices become activated with thoughts and memories. Without a functioning RAS there is no bodily connection. The fMRI imaging reveals only cortical brain activity, identifying activity and consciousness. Without a functioning RAS there is a type of disconnection, akin to being "comatose" or "locked-in." The RAS responds to stimuli from all sensory systems through its afferent and efferent pathways. These pathways integrate sensory, visceral, limbic, and motor functions. Reticular circuits branch throughout the central nervous system and exert important influences on autonomic regulation of vital organ systems, levels of alertness, sleep cycles, somatic motor activities, pain modulation and behavior.



In this image the left hand at the base of the skull points to the alata major center, in the etheric field, which aligns with the location of the cerebellum, medulla oblongata and the RAS. The finger on the right is pointing to the ajna center in the etheric field. The organ point is the bilateral carotid gland.

The alata major center is considered a minor chakra, but functions as a major chakra according to the teachings of the ancient esotericists. In the head triangle, the alata major has a unique position, first because of its relationship in the head triangle and second, due to its powerful link to the cerebellum, the medulla oblongata and the spine. The cerebellum is part of the hindbrain and controls voluntary muscles and movement – and is energetically linked to the root or base chakra. The medulla oblongata, also part of the hindbrain is closest to the spinal cord and is involved with the regulation of heartbeat and rate, breathing, blood pressure and reflex centers. The medulla is energetically connected to the throat and heart center chakras. According to Vedic teachings it is necessary to

² Image source: Hopking, Alan; <http://www.bluedolphinpublishing.com/INTRODUCTION1.pdf>, p. 7

activate and balance the alta-major center in order to achieve ascension in the next phase of human development.

The following thesis introduces an overlay of energetic axes involving the RAS, vagus nerve and the alta major center, which may play a role in transmitting information through the cellular matrices interoceptively. This axis may be equally important to understand, as is the HPA Axis, or brain-gut connection when considering states of health and levels of consciousness including our spiritual consciousness.

The purpose of outlining this axis is to bring awareness to the overlap of energetic physiology with conventional neurophysiology/biology. In so doing, we may learn about a spiritual consciousness in kinship with physical consciousness necessary for the purpose of balance, health and creativity. The goal of this thesis is to create a foundation and stimulate thought regarding (energy) physiology, the body mind connection and how our focus shapes our health and environment.

Keywords: RAS, reticular activating system, vagus nerve, alta major, chakra, consciousness, spiritual development, esoteric healing, presence, transcendence, nervous system, bodymind, mind-body, neurophysiology, subtle energy, spirituality, higher mind, etheric energy, prana, life force, biophotons, Bonghan ducts, primo-vessels, fascia, tensegrity, collagen, meridians, esoteric anatomy, CN-X

Abbreviations: RAS = reticular activating system; RF = reticular formation; ANS = autonomic nervous system; CN-X = tenth cranial nerve; HPA = Hypothalamus-Pituitary-Adrenal; fMRI = Functional Magnetic Resonance Imaging

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CHAPTER 1: INTRODUCTION

*“Medicine and Spirituality can be integrated”
---Joyce Whiteley Hawkes*

The investigation and concept of creating a new axis has been a remarkable journey. Sharing a curious anatomical overlay, the three aspects of this axis are: the reticular activating system (RAS), the vagus nerve and the alta major chakra. What follows is a brief background on what led to my linking these three very different aspects of the human physiology and subtle energy anatomy.

In the Spring of 2004, during the first day of Pilates and human biomechanics training, we learned how the eyes inherently begin the body’s proprioceptive movement. We discussed fascia as a ubiquitous and collagenous web-like connective tissue, which surrounds every cell, organ and muscle of the body. Though we discussed many other parts of the body, the combination of the eyes and their fascial connection to the brain along with the optical nerve, set off an intense and distracting passion. I wondered, *“Is fascia a communicative web?”* Later, I further wondered, *“When a person witnesses or experiences trauma, is the fascia the cellular communicator sending messages from the eyes to the rest of the body? Why is there fascia surrounding every organ and every cell in our body? Why did nature do that? How does proprioception and interoception fit in with this notion of connective tissue? If there is such a system of communicative tissue, could this be how cancer metastasizes?”* During my two years of Pilates training I did not find these answers, though this single day’s experience excited me and ignited a heartfelt passion to continue to seek and study. I arrived to Holos University in April 2006, announced some of my curiosities and learned that I have peers: James Oschman,

Bruce Lipton, Tom Myers, Alfred Pischinger, Candace Pert, Ida Rolf, Valerie Hunt, Joseph Chilton Pearce, Mae Wan Ho and many others.

In October 2007, I attended the *First International Fascia Research Congress: Basic Science and Implications for Conventional Complementary Healthcare* at Harvard Medical School, where a number of lectures confirmed to me that I, indeed, have like-minded compatriots. By that time, I had honed a specific interest regarding the physiological effects of various states of mental excitation and inhibition triggered by stressful and relaxed conditions. Nearly a year later, during a personal encounter with Candace Pert, she suggested I needed a body-mind centric lab in which I could examine stem-cell-monocytes in rats, measuring changes in muscle contraction and relaxation as a result of changes in their environment. Although Holos does not have access to labs of this type, I remained intrigued and impassioned by ideas and concepts of how the body communicates with itself and the surrounding environment. Again with the questions, “*How does the body signal and sequence information? How do a person’s perceptions and beliefs relate to what is perceived in the environment? How does the perceived data affect the physiology of the body? Does the brain actually store information? What effects do emotional memories have on the body? What can we do about our physiological responses through the focused use of our conscious mind? What is going on inside our physical and emotional systems, and how does this affect our proprioception and interoception?*” I am still interested in Pert’s suggestion, but since it left out a Spiritual component, my search continued.

It seems as though I have tripped upon questions that are centuries old and questions that have led to great assumptions and theories in our modern systems. Still, we have no empirical proof of where consciousness originates, nor a working definition of consciousness that satisfies psychologists, philosophers, neuroscientists and lay people. As much as we know about the human organism, there is so much more to learn.

In 1925 Walter Addison Jayne, a medical doctor who wrote *The Healing Gods of Ancient Civilizations* stated, “There is an important place today for the theories of healing utilized by the ancient civilizations. The mind and body have not changed significantly in the last few thousand years, only the manner in which we view and utilize their relationship.”¹ In the last few decades there have been several triads and axes introduced to medicine; perhaps by practitioners who at an earlier time limited their scope of study to a singular area of the body, only to find a significant and bi-directional relationship to another part of the body. Some of these junctions are: the Hypothalamic-Pituitary-Adrenal (HPA) Axis, the Liver Triad Axis involving the Liver, Pancreas and Stomach/Small Intestines, the Brain-Gut Axis and more. In the future, as we move from the typical principles of exclusion (reductionism), toward principles of inclusion, I believe we will find more interesting ways of observing the body’s behavior. In about the fourth century B.C., the Greeks codified six medical axes with astrological signs.

- Gemini/Sagittarius: The Respiratory Axis
- Taurus/Scorpio: The Generative Axis
- Aries/Libra: The Renal Axis
- Cancer/Capricorn: The Nutritive/Structural Axis
- Leo/Aquarius: The Circulatory Axis
- Virgo/Pisces: The Digestive/Immune Axis²

Each of these axes are associated with particular viscera, system, tissue-type and body part; each having its own associated imbalances, syndromes, pathology and dysfunctions; each with the potential to influence equilibrium.

The Diagnostic and Statistical Manual of the American Psychiatric Association (DSM IV-TR) lists sets of psychological disorders that involve certain axes. The diagnostic process, in fact, uses five dimensions called 'axes' to ascertain symptoms and overall functioning of the individual. These axes are:

1. Axis I - Symptom Disorders
2. Axis II - Personality Disorders
3. Axis III - General Medical Conditions
4. Axis IV - Psychosocial/Environmental Problems
5. Axis V - Global Assessment of Functioning³

For this thesis, I developed an axis that brings all of my focused passions to what I believe is a unique intersection involving the human physiology and subtle energy, and in which I believe, we have a connection to Spirit Consciousness. I call this body-mind-spiritual intersection the RAS-Vagus Nerve-Alta Major Chakra Axis. I refer to this intersection as an axis because of the apparent geometric points of connection and the potential components of their relationship. The RAS responds to stimuli from all sensory systems through its afferent and efferent pathways. These pathways integrate sensory, visceral, limbic, and motor functions by means of the vagus nerve. The reticular circuits branch throughout the central nervous system and exert important influences on autonomic regulation of vital organ systems, levels of alertness, sleep cycles, somatic motor activities, pain modulation and behavior. The alta major chakra is a relatively unknown chakra in the typical “traffic light” chakra system, with which we have become

most familiar. According to the ancient teachings, the alta major is the last chakra or energy center to activate allowing for a transcended human condition.

Many of the ancient teachings made no separation between human life and the Divine. The RAS-Vagus Nerve-Alta Major Chakra Axis acknowledges energy physiology by synthesizing neurophysiology, the nervous system and spiritual concepts, which find their roots in ancient cosmological teachings. For the purpose of clarity, I found the need to identify two different types of consciousness. The first and most common type is consciousness with a small “c”, which represents consciousness contained in the local domain of our physical bodies, with the potential of being alert and focused, and allows for the experience of various dream states and altered states of consciousness, as in hypnosis. The other type is capital “C” Consciousness. After the first section, I use Consciousness with a “C” to depict our connection to an expanded awareness or Consciousness, which functions as our connection to God/Source/Spirit, or the Divine. It is not my intention to create a neologism, but rather, bring clarity to commonly used terms that have the capacity to confuse, especially when roaming in the realms of neuroscience.

This thesis examines the curious overlap of the physical systems and the subtle energetic systems, especially with respect to how the ancients viewed them. The ancient cosmologies did not have the mind-body conundrum that we, in the West, appear to have. The ancient cultures believed that the internal and external environments, as well as the mind, all played an integral part in our overall health and quality of life. Ancient teachings bring us elements of the invisible regarding life-force energy, which are discussed in the text. Western medicine teaches that there are multiple axes throughout

the body but for the most part, Western, or allopathic medicine, posits systems of the body as mostly stand-alone or isolated somehow. In this discourse I look to the reticular formation as the junction of the brain's power supply to the multiple internal systems of the human body. Though I focus tightly on the RAS, vagus nerve and the alta major chakra in this three-part axis, well considered is the whole brain, body and its energy fields. The RAS and reticular formation (located in the brainstem) acts as a conduit conducting afferent and efferent nervous system impulses by way of the body's naturally occurring biogenic amines, which link body and brain. The biogenic amines are present throughout the body and are the communication molecules of the nervous system. The vagus nerve, as you will see, is the only nerve in the body that wanders to every organ of the body. I believe the fascial connective tissue is part of the nervous system's communication loop. However, due to space constrictions my focus is limited to the RAS, vagus nerve and alta major chakra as an overlapping nexus.

This axis may be equally important to understand, as is the Hypothalamus, Pituitary and Adrenal (HPA) Axis, or brain-gut connection when considering states of health and levels of consciousness including our spiritual consciousness.

What I have put forth here is purely a base, a foundation of some neuroscientific knowledge, blended with some ideas that have been marginalized in our scientific pursuits. I do not claim to have answers; in fact, I know I have more questions than answers. This thesis is a non-linear journey that attempts to grapple with ancient esoteric teachings and how they relate to body and mind as perceived by modern medicine. These chapters are only a point of entry into what will be a deep-dive in topics that will occupy

my heart and mind for years to come, and which I hope will stir some curiosities in you, the reader.

The goal of this thesis is to create a foundation and stimulate thought regarding (energy) physiology, the body mind connection and how our focus shapes our health and environment.

I believe the connection and balanced activation of the RAS-Vagus Nerve-Alta Major Chakra Axis represents the physiology of presence and spiritual transcendence.

CHAPTER 2: GROSS NEUROANATOMY AND FUNCTION OF THE RETICULAR FORMATION AND RETICULAR ACTIVATING SYSTEM

“Architecture is the will of an epoch translated into space.”

--- Ludwig Mies van der Rohe

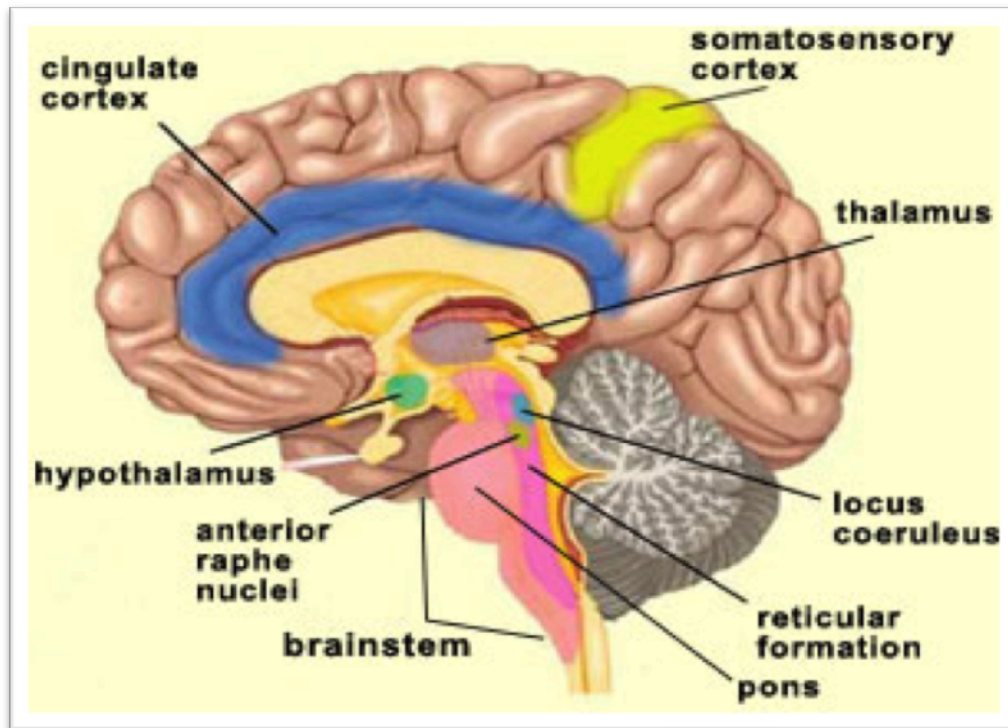


Figure 1.⁴ **Gross Brain Anatomy image outlines basic neuroanatomy structures**

The term reticular formation (*reticularis* or *substantia reticularis* from *reticulum*, Latin for “net-like”) first introduced by anatomists in the late nineteenth century. Designated parts of the brainstem, the medulla, pons and midbrain (Figure 1), are made up of cells of various sizes and shapes, scattered within the core of the brainstem encased in a complicated network of fibers running in varied directions. Some early anatomists chose to drop their examination of this area of the brain because of its complexity and their opinion of its “disorganization.” Today, during year 2010, I think we can and do

embrace the complexity more readily, rather than dismissing it, and have come to recognize that further investigation is warranted.

In the core of the brainstem reticular formation lie intricate, highly structured and overlapping dendritic fields which arise from several distinct nuclei (groups of nerve cells) embedded within the network itself. Strands of nerve fibers, called *tracts*, lead from these nuclei to communicate with other parts of the central nervous system. These tracts of neuronal fibers receive (from "sensory nuclei") and send (to "motor nuclei") information involved in specific brain functions. Figures 2 through 5 depict the anatomy and (partial) function of these nerve fibers.

Motor Neuron (efferent system):

- Efferent Neuron – moving away from a central organ or point
- Relays messages from the brain or spinal cord to the muscles and organs (this is motor function)

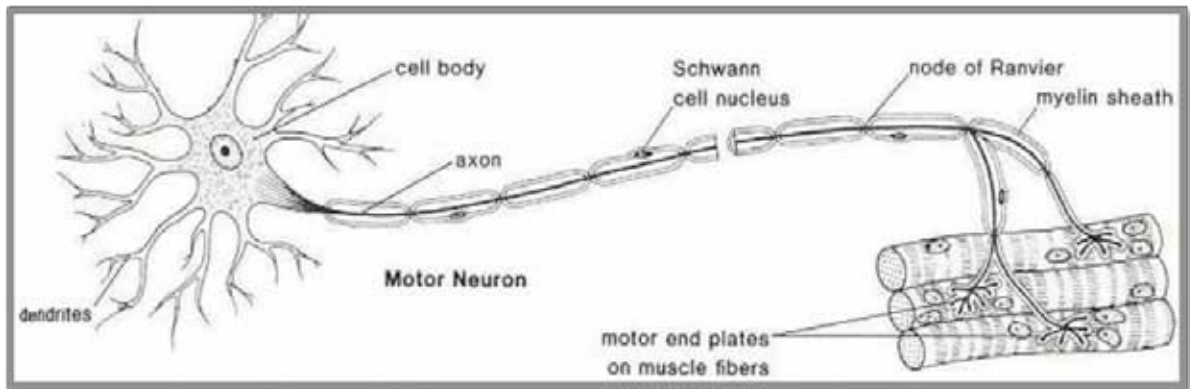


Figure 2.⁵ **The Motor Neuron**

Sensory Neuron (afferent system):

- Afferent Neuron – moving toward a central organ or point
- Relays messages from sensory receptors (of the five senses: touch/pain, hearing, smell and vision) to the brain or spinal cord (this is a sensory function)

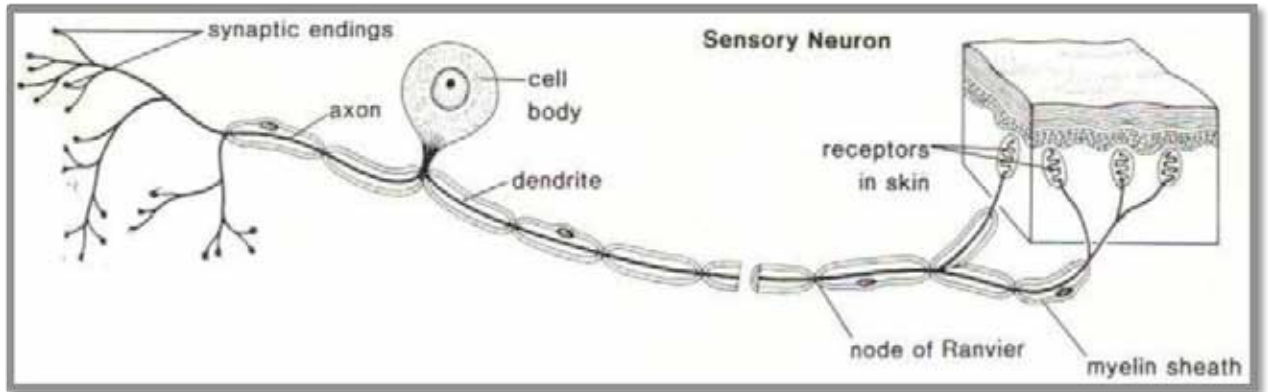


Figure 3.⁶ The Sensory Neuron

Interneuron (relay neuron):

- Relays message from sensory neuron to motor neuron
- Interneurons connect other neurons within the brain and spinal cord

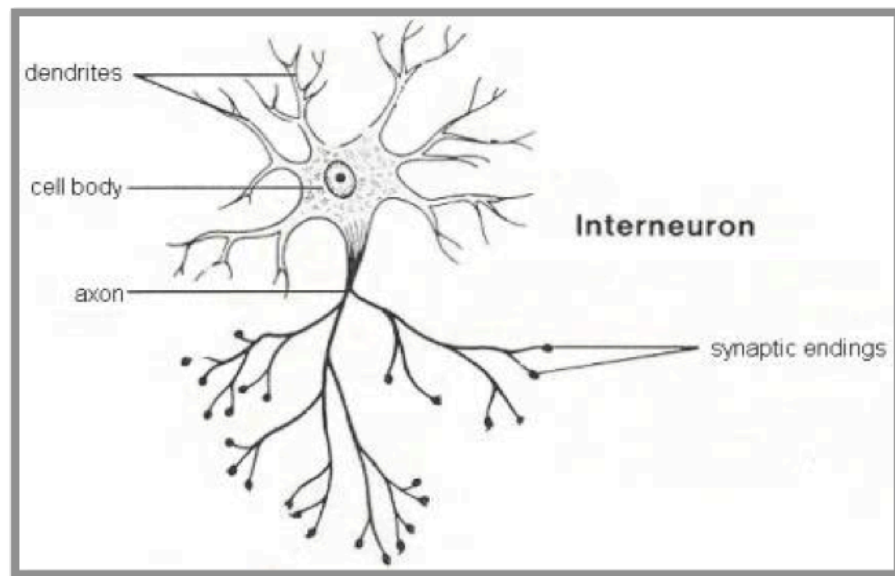
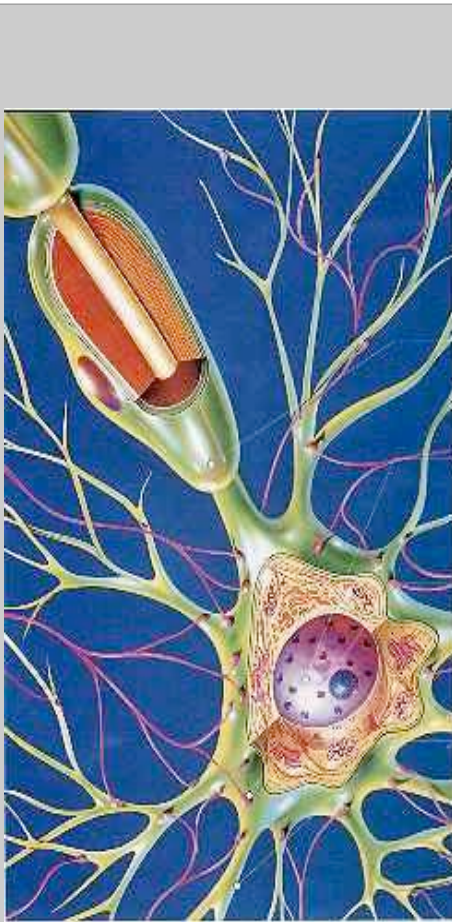


Figure 4.⁷ The Interneuron or Relay Neuron



Neurons are similar to other cells in the body because:

1. Neurons are surrounded by a cell membrane.
2. Neurons have a nucleus that contains genetic material.
3. Neurons contain cytoplasm, mitochondria and other organelles.
4. Neurons carry out basic cellular processes such as protein synthesis and energy production.

Neurons differ from other cells in the body because:

1. Neurons have specialized extensions called dendrites and axons. Dendrites receive stimulation from outside the nerve cell and axons transmit stimulating impulses to other nerve cells.
2. Neurons communicate with each other through an electrochemical process.
3. Neurons contain some specialized structures (synapses) and endogenous chemicals (neurotransmitters/neuromodulators), which facilitate or inhibit intercellular energetic communication.

Figure 5.⁸ **An illustration of a neuron, its axons and signaling dendritic pathways**

Most cranial nerves have their nuclei in the brainstem. These include cranial nerves III, IV, V, VI, VII, VIII, IX, X, XI and XII. Each of these neurons collaterally branch to their respective regions cortically within the brain for transmission of information with correlates to various body parts. This will be discussed in greater detail in sections to follow. See Figure 6 for the body correspondences.

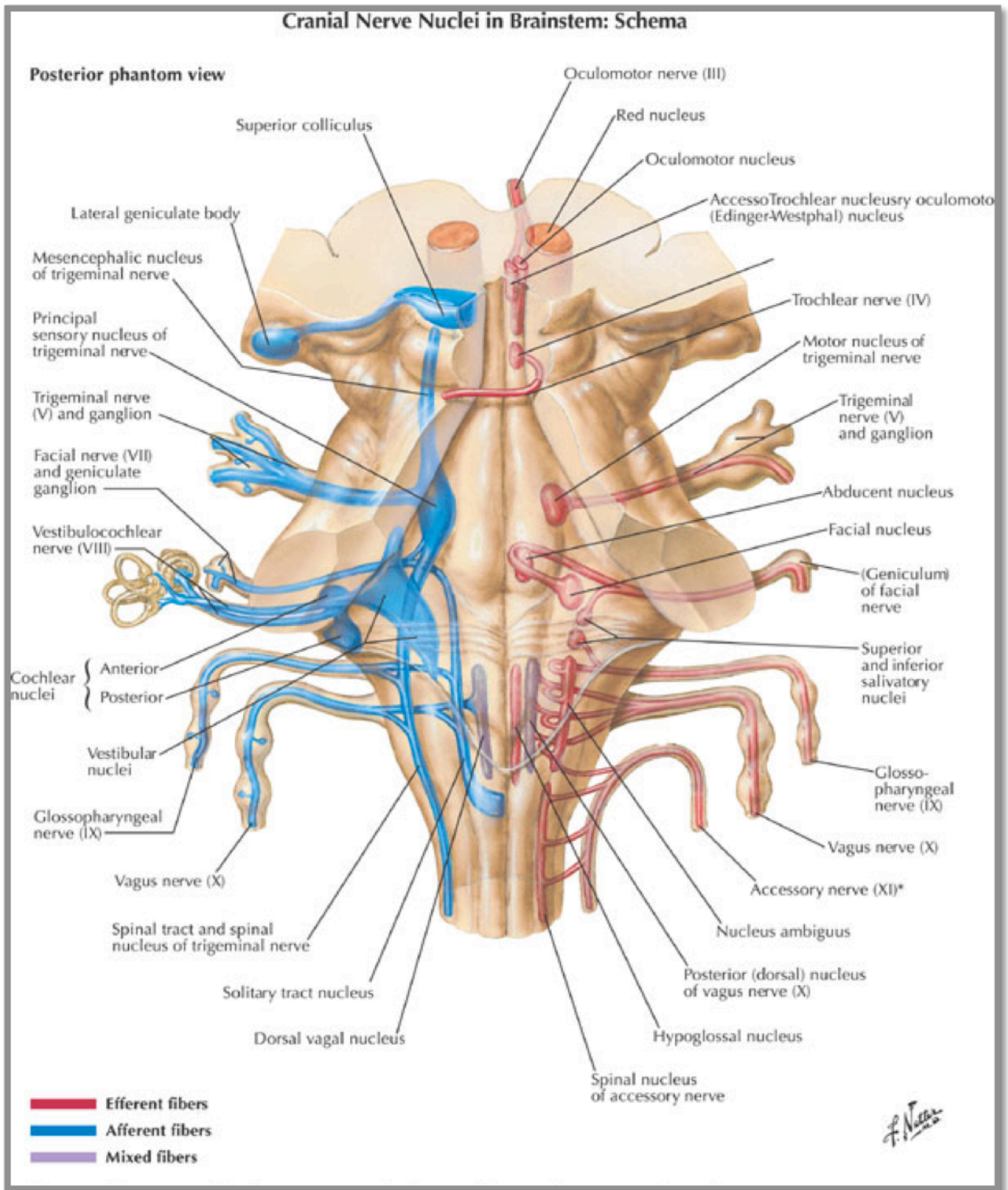


Figure 6.⁹ **Schema of Cranial Nerve Nuclei in the Brainstem**

Efferent fibers are shown in the color red, and the afferent fibers are shown in the color blue.

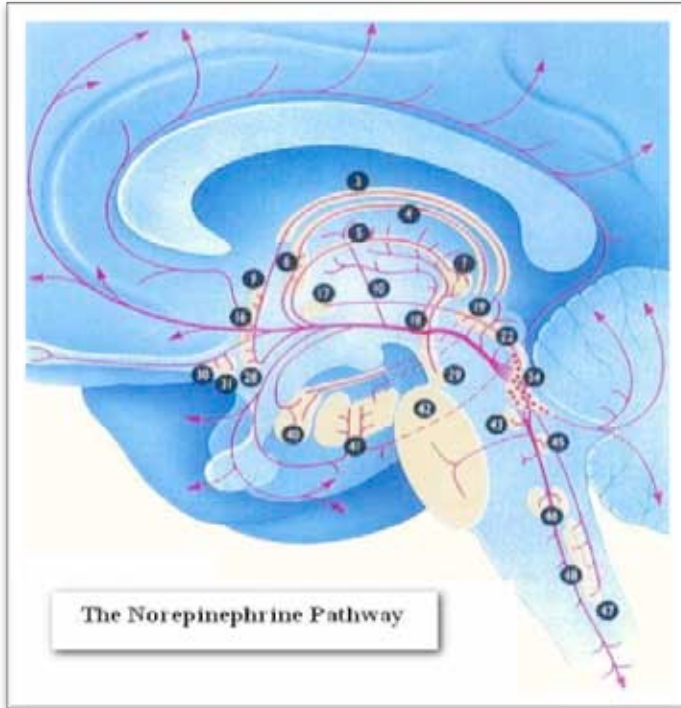
The reticular formation is a complex organization of cells and fibers, but it is not random, nor is it “poorly organized.” There are well-defined sub-nuclei, well characterized cell types and highly organized projections. Beginning about a third of the way down its length caudally (posterior), the reticular formation contains the Reticular Activating System (RAS). The Reticular Activating System has been described as the part of the reticular formation in the brainstem that plays a central role in bodily and behavioral alertness; its ascending connections affect the function of the cerebral cortex and its descending connections affect bodily posture and reflex mechanisms.¹⁰ The RAS runs up the center of the brainstem, and is influenced by a diversity of neurotransmitters (e.g., serotonin, norepinephrine, GABA). The RAS is central to human consciousness and sleep states; these and other states of consciousness are activated and modulated biochemically. It is stated by Nogrady and Weaver, authors of *Medicinal Chemistry: A Molecular Biochemical Approach*, a neuropharmacology textbook that: “The brainstem (particularly the medulla and pons) is crucial to life, with many injuries to the brainstem being rapidly lethal; the drug designer who targets receptors in the brainstem must keep in mind a deep appreciation for the fundamental role of the brainstem in life.”¹¹

The structures of the reticular formation demonstrate a variety of dendritic patterns. Cells may be divided into three categories based on the dendritic pattern which they exhibit: First: *Isodendritic* cells are symmetrical, with dendrites radiating in all directions for long distances. These dendrites branch out and overlap neighboring nerve cell bodies. Isodendritic cells are the most common type and form the core of the reticular formation. Second: *Allodendritic* cells are more pyramidal-like and are found in the medial and lateral portions of the pallium. Anatomically, the pallium is usually

divided into three zones: medial, lateral, and dorsal. The medial pallium forms the precursor of the hippocampus. Third: *Idiodendritic* cells are the most specialized of all. These cells tend to stay within a zone or nucleus. The axons of all these dendritic cell types ascend and descend along the axis of the brainstem. Ascending axons are carried in the central brainstem tract, the tegmentum. Descending axons are carried in the reticulospinal tract. These connections up and down the brainstem ensure a brain and body connection, like telephone wires communicating from and to all sensory systems, brain to body and body to brain. The reticular formation and specifically the RAS appear to be the centralized hub of brain-body communication. If this area of the brainstem is damaged or contains a lesion it may induce coma or a paralytic state. The RAS acts like a conduit for various neurotransmitters, a group of bioactive, endogenously produced amines. The most important of the neurotransmitters in the RAS is norepinephrine, which is also considered a neuromodulator. It is involved in such physiologic functions as emotional reactions, memory, sleep, and arousal from sleep. Other prominent neurotransmitters and neuromodulators found in the RAS include acetylcholine, serotonin, and dopamine. “These substances are active in regulating blood pressure, elimination, body temperature, and many other centrally mediated body functions.”¹² The cells described above, like many other cells in the body, transmit messages by means of these neurotransmitters and neuromodulators (see Figures 7 through 12). Susan Greenfield, a professor of pharmacology at Oxford University, a lecturer and author of several neuroscience books, states, “A nerve cell might have its cell body in the brainstem, but fibers that reach the cells in the cerebral cortex.”¹³

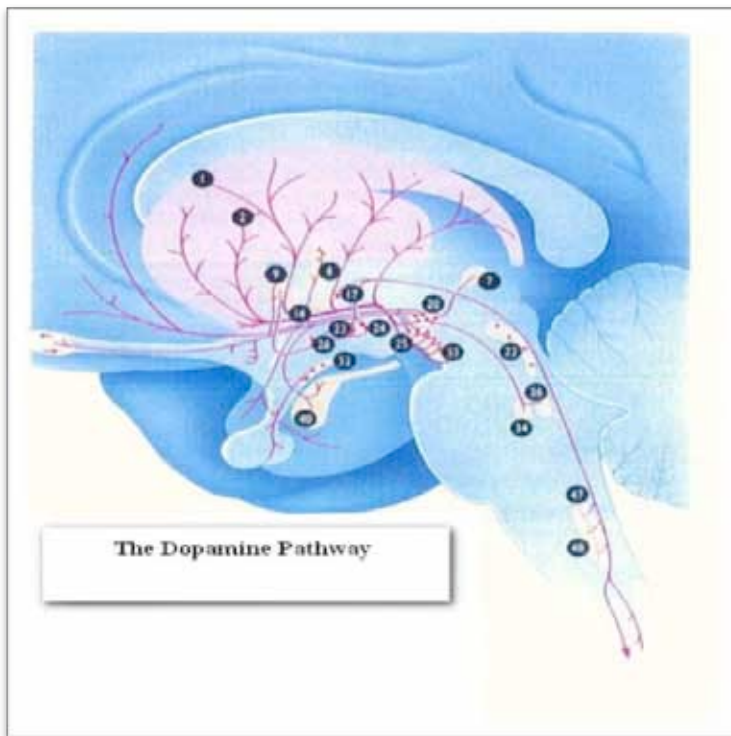
The influential and visionary nineteenth century neuroscientist, Ramón y Cajal, estimated that neurons are not fused to another like soldered wires forming a circuit, but rather each neuron is like an island unto itself. Each neuronal island communicates to another neuron through tiny (ion) channels of saltwater that bathe every cell in the body. The messages are communicated via endogenous chemicals or biogenic amines (e.g., norepinephrine, glutamate, GABA), sometimes collectively referred to as messenger molecules. “Neuromodulation differs from neurotransmission in that signaling molecules are very widely distributed through parts of the brain. The same molecule may play two different roles, depending on where it is secreted.”¹⁴ Neurotransmitters are estimated to move faster through the synaptic ion channels than neuromodulators.

The location in the brain of the nerve cell bodies and projection fibers of six of the important neurotransmitters and neuromodulators are illustrated in the figures below. The numbers in the round circles refer to the anatomical structures in the legend, which follows the figures.



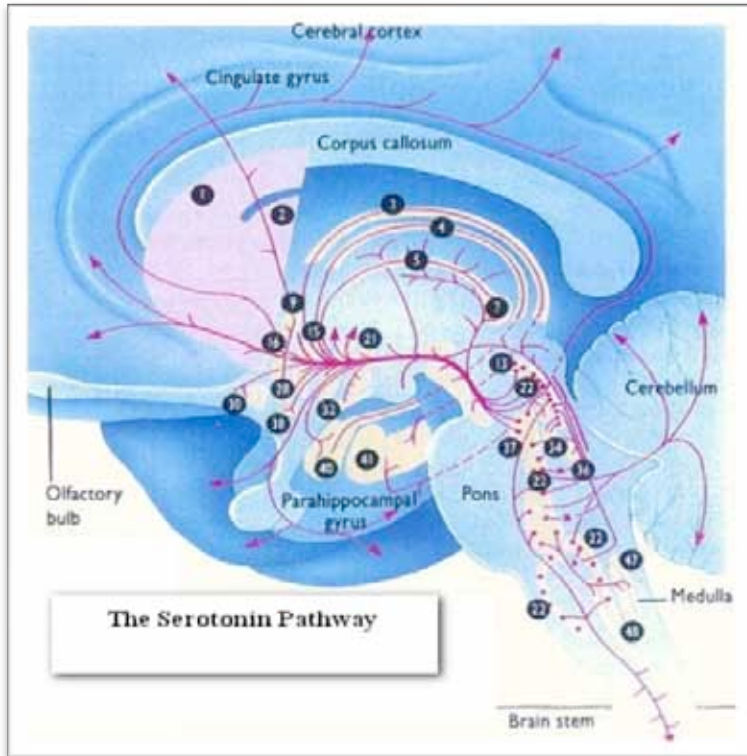
Norepinephrine is a part of the monoamine group and can be both excitatory and inhibitory. In the brain, the nerve cells that release norepinephrine are clustered in the locus coeruleus (34). Their message carrying axons branch out to many regions in the brain. Norepinephrine is involved in arousal levels, as well as autonomic control of body functions, such as temperature regulation. Norepinephrine is also considered a neuromodulator.

Figure 7.¹⁵ **The Norepinephrine Pathways**



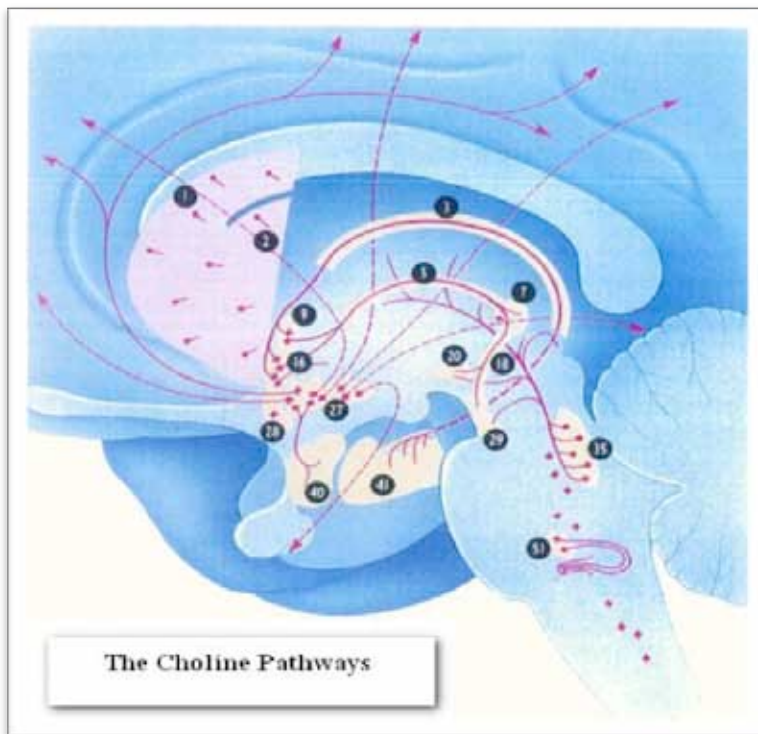
Dopamine is one of the amine group of neurotransmitters and neuromodulators. It is involved in arousal levels and in motor activity. In the brain it can be a modulatory neurotransmitter – it can bias the response of nerve cells when it is released. Dopamine is thought to play a major role in schizophrenia (abundant amount) and Parkinson's (low amount).

Figure 8.¹⁶ **The Dopamine Pathways**



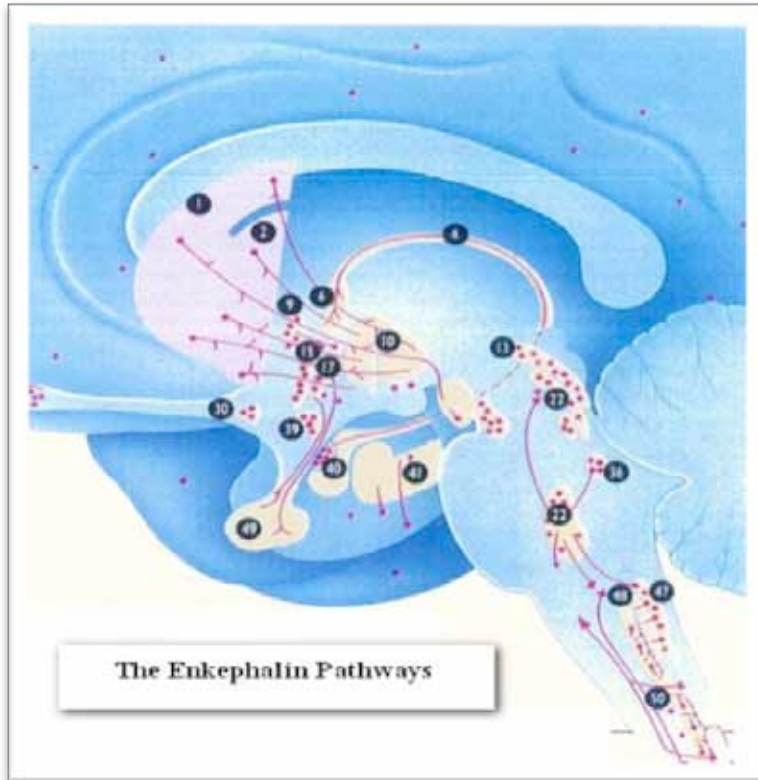
Serotonin or 5-HT is an amine neurotransmitter and neuromodulator that can be both inhibitory and excitatory. Serotonin-releasing neurons have fibers widely distributed in the brain, and serotonin is important in mood, sleep, pain, and appetite. Studies have shown large amounts of 5HT in the gut, creating an upsurge of research regarding a ‘brain–gut’ connection, also known as the enteric nervous system. 5HT is an example of how “the same molecule may play two different roles, depending on where it is secreted” as referenced above.

Figure 9.¹⁷ **The Serotonin Pathways**



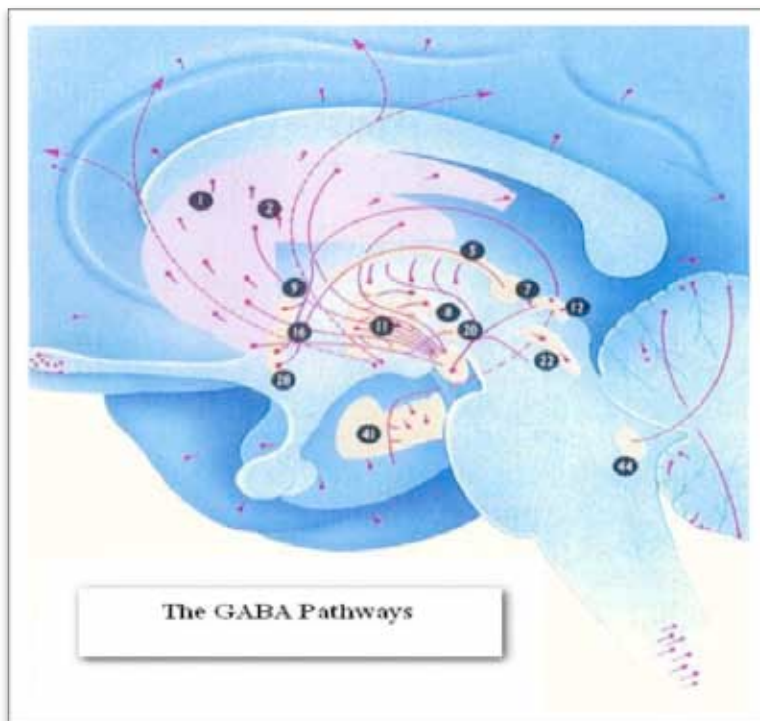
Cholines, essentially acetylcholine, can be both excitatory and inhibitory, and is both a neurotransmitter and neuromodulator. They play a part in memory and mediate attention and conscious arousal in all sensory systems.

Figure 10.¹⁸ **The Choline Pathways**



Enkephalins are part of the neuropeptide group occurring in the brain and spinal cord as well as the gastrointestinal tract. They have potent opiate-like effects and are the body's own painkilling neurotransmitters.

Figure 11.¹⁹ **The Enkephalin Pathways**



GABA or gamma-aminobutyric acid is one of the amino acid group of neurotransmitters and neuromodulators. In the brain it is inhibitory; its release makes nerve cells less likely to "fire," and slows down the activity of nerve cells in the brain, which is the modulators' function (to slow things down).

Figure 12.²⁰ **The GABA Pathways**

Table 1.²¹ **Table of brain anatomy corresponding to neurotransmitter pathways depicted in figures 7 through 12**

Legend: Brain Anatomy corresponding to Figures: 7 through 12					
1	Caudate nucleus	18	Habenulo-interpeduncular tract	35	Dorsal tegmental nucleus
2	Putamen	19	Dorsal longitudinal fasciculus	36	Lateral parabrachial nucleus
3	Fornix	20	Ventral tegmental area	37	Superior central nucleus
4	Stria terminalis	21	Hypothalamus	38	Suprachiasmatic nucleus
5	stria medullaris	22	Raphe Nuclei	39	Supraoptic nucleus
6	Nucleus interstitialis striae terminalis	23	Cell Group A13	40	Amygdala
7	Habenula	24	Cell Group A11	41	Hippocampus
8	Subthalamic nucleus	25	Substantia nigra	42	Pons
9	Septum	26	Cell Group A14	43	Lateral lemniscal nuclei
10	Mammillothalamic tract	27	Meynert's nucleus	44	Vestibular nucleus
11	Globus Pallidus	28	Ventral diagonal nucleus	45	Trigeminal nerve nucleus
12	Superior Colliculus	29	Interpeduncular nucleus	46	Cochlear nerve
13	Midbrain gray matter	30	Anterior olfactory nucleus	47	Nucleus solitarius
14	Anterior commissure	31	Olfactory tubercle	48	Dorsal vagal nerve nucleus
15	Preoptic nucleus	32	Infundibular nucleus	49	Parabrachial nuclei
16	Dorsal diagonal nucleus	33	Retrorubral area	50	Spinal nerve
17	Paraventricular nucleus	34	Locus coeruleus	51	Olivary nucleus

Neurons and neurotransmitters can be considered the "brains" of the nervous system. By 1965 there was significant evidence regarding the monoaminergic presence in the central nervous system, specifically dopamine (DA), norepinephrine (NA) and serotonin (5HT). In a landmark paper, Kjell Fuxe (Fuxe, 1965) announced his findings. "Three different types of neurons containing DA, NA and 5HT – have been identified. Their cell bodies show low concentrations of the amines and are localized to numerous cell groups, mainly in the lower brainstem. The axons however, give rise to characteristic terminals which -- in contrast to the other parts of these neurons – show tremendous accumulation of the amines."²² During the 1960s, specific fluorescent staining methods were

increasing in their use and sophistication and today allow for a more holistic view of neuron function and the nervous system branches. Though still not perfect, cell and tissue fluorescent staining facilitates our view of cellular structures and their associated proteins, and allows us to more fully appreciate the nervous system as the body's response and communication network. This network is often referred to as the mind body or *Psychosomatic Network* (Pert, 1983).

At a macro level the nervous system serves three main functions:

1. Senses changes both inside and outside the body (the sensory function)
2. Interprets (based on perception) and chemically communicates the changes throughout the body (interoception)
3. Communicates as the body responds to the processed information by triggering muscle contractions and stimulating glands to secrete hormones or other chemicals into the bloodstream or digestive tract (the motor function)

To conclude this section on gross neuroanatomy two images below will assist the reader in visualizing the placement and function of the reticular formation and reticular activating system within the brainstem. This first image outlines the brainstem (tegmentum) and illustrates a cross section between successive thirds of the brainstem. In this illustration the reticular formation is divided into four zones all along the brainstem axis. These ventrally viewed cross sections depict the four zones: mesencephalic (most rostral), pontine, trigeminal and medullary (most caudal) zones. “Neurons in the reticular formation are scattered among the axon bundles that course through the medial portion of the midbrain, pons, and medulla.”²³

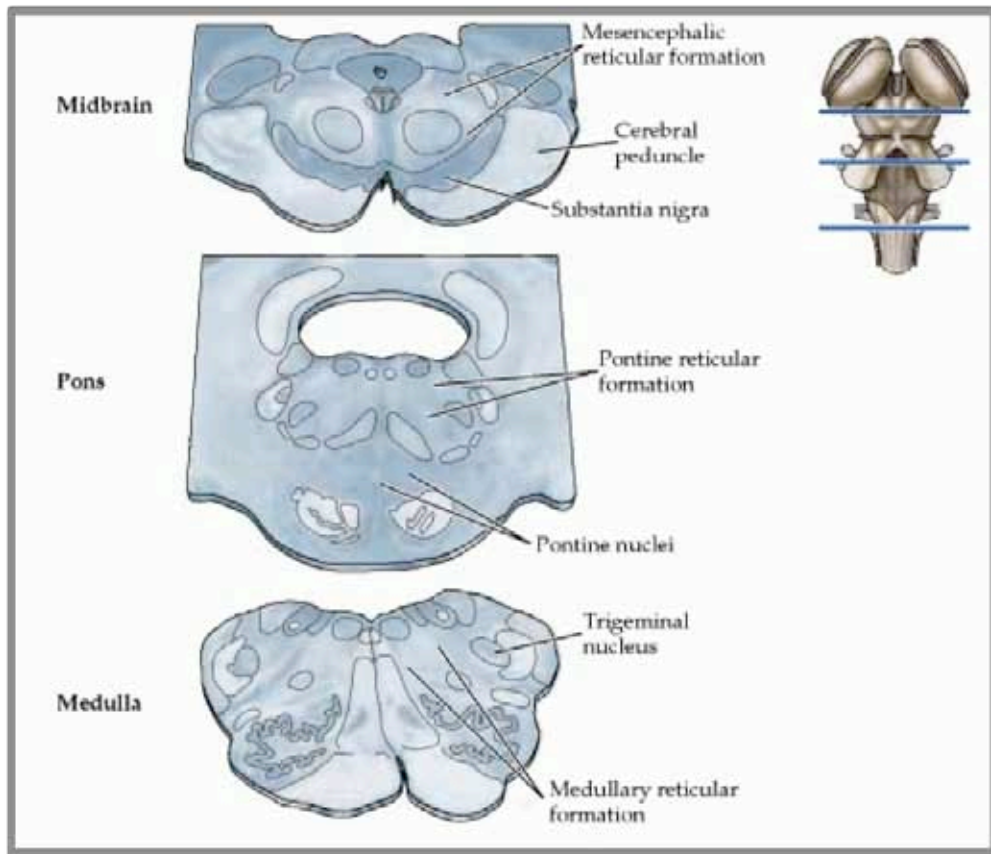


Figure 13.²⁴ **The location of the reticular formation in relation to some other major landmarks at different levels of the brainstem**

Each one of these zones has specific neuronal cytoarchitecture, where afferent and efferent cell signaling occurs, using the various messenger molecules enumerated above. It becomes troublesome to definitively associate cell groups within any given structure as exhibiting strictly an excitatory or inhibitory behavior. This area of neuroscience is a constantly changing landscape of estimated parameters. This should be expected, as we are dealing with structures that are alive and adaptive. A professor of anatomy and human cadaver dissection said, "It is like there is a divine intelligence that reorganizes systems based on what is needed, and as a professor, I teach the norms, but there is a common variance of all the bodies and brains I dissect."²⁵ The cytoarchitecture, cell

types and the associated messengers are part and parcel of a very complex system of feedback loops. Because we are still learning and gathering data about human neurophysiology, especially region-specific presynaptic and postsynaptic cell signaling, the next section is a particularly difficult platform on which to depend long term.

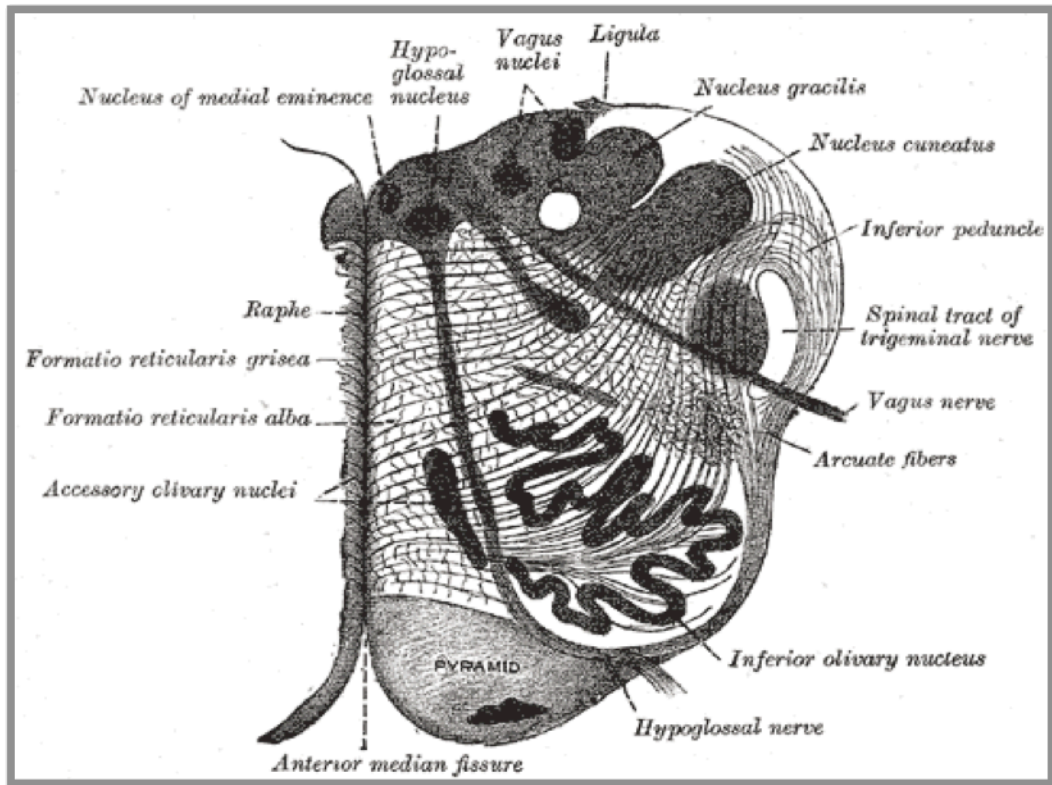


Figure 14.²⁶ **An illustration of a midline slice of the medulla oblongata**

Figure 14 depicts a section of the medulla oblongata, sliced at midline, above the olivary nucleus and illustrates five zones, from medial to lateral, which are present at all levels of the brainstem.

The five zones are:

1. Central zone
2. Paramedian zone
3. Medial zone
4. Lateral zone
5. Intermediate zone

The center-most zone of the reticular formation is the location of the *raphe nuclei* (raphe is Greek for seam). The raphe nuclei are a group of cells that lie along the midline of the brainstem. The cells of these nuclei are interspersed among the fibers that cross to the other side. They form a continuous column, yet there are distinct separations in the cell architecture (as mentioned above) along the column, and different efferent projections as one moves along the column. At the present time, it is believed that all fibers of the raphe nuclei contain serotonin or 5HT, a neurotransmitter that usually has an inhibitory effect. However, serotonin can also act as an excitatory neurotransmitter, though mostly found to behave excitatory fashion outside of the raphe nuclei zone.

The second zone is the paramedian zone. This zone consists of paramedian reticular nuclei and the pontine reticulotegmental nuclei, where mostly acetylcholine is believed present. These fibers are involved in motor function and project to the cerebellum.

The third zone is the medial zone. This zone contains small and large cells that have bifurcating axons that ascend and descend. Cells from this area project to the hypothalamus and thalamus via the central tegmentum (brainstem) tract, and they also project to the spinal cord via the reticulospinal tract, which forms the major output tract of the reticular formation.

The fourth zone is the lateral zone. This zone contains small cells that have relatively short ascending and descending axons that terminate primarily within the medial zone. This lateral zone is thought to be an afferent association area because it receives multiple sensory inputs from the spinal cord, cranial nerves and cerebrum.

The fifth and final zone is the intermediate zone. This zone sits between the lateral and medial zones and is found only in the medulla. It is involved in the autonomic regulation of respiration, heart rate and blood pressure, and is often referred to as the seat of the unconscious brain.

Mapping these zones, branch type and connections is a very complicated task involving the efforts of neuroscientists, neurochemists and neurophysiologists at various institutions around the world, with each such study taking years to complete. What we estimate as truths now remains debatable. For example, some neuroscientists assert that we have one hundred billion neurons and trillions of synaptic branches in the left hemisphere alone, with an estimated eighty-five billion neurons in just the cortex. These estimations may be revisited in the future, but for now these are the working numbers.²⁷ Dr. Bernard Baars, Director of the Center for Consciousness Studies the University of Arizona Medical School in Tucson and an expert in cognitive neurosciences, uses the analogy of taking a satellite snap shot over a dense rain forest. Mostly what would be seen are branches (dendrites and axons), which makes the counting of the trees (neurons) very difficult. Labs around the world seem to rely on these same numbers of synapses and neurons, so for now these figures are considered a working standard. What is widely debated is why all of this matters. What more does it teach us about consciousness?

A paper written by well-respected neuroscientists, Josef Parvizi and Antonio Damasio titled, *Consciousness and the brainstem* (2000), set out to summarize a theoretical framework based on several hypotheses aimed at consciousness and the neurobiological terms. Despite their finding the brainstem involved in nearly every

activity in the body, they concluded, “The intriguing overlap of functions attributable to the several families of brainstem nuclei – emotion, wakefulness and sleep, basic attention, and of course consciousness itself – becomes less intriguing [my underline] when it is seen in the perspective of homeostasis, the ultimate physiological role of all the operations in which these are [sic] nuclei are involved.”²⁸ Essentially they concluded that these brainstem nuclei do nothing more than regulate and turn systems on and off. This is a puzzling conclusion especially in light of Damasio’s books on the topic of consciousness and emotions. In an effort to understand their conclusions, I engaged Dr. Bernard Baars in an email discussion. (See Appendix A for the actual email exchange).

Tiffany Barsotti: Why is this “less intriguing”? Is it because they found the only service of the brainstem nuclei is to keep homeostasis?

Personally I believe in homeodynamic over homeostasis – as we are always balancing internal and external signals; and I believe there is a lot more going on in the body than just stabilization. Co-factors of consciousness related to how we process stress, trauma, joy, food, anger, fear, and inflammation -- make the brain chemicals and their flow VERY intriguing.

This conclusion is a bit confusing to me given the content of this article. I would love your take on this.

Dr. Bernard Baars’ response: I agree with you, Tiffany. On both points.

What they are saying --- incorrectly --- is that consciousness is in the brainstem. That is only true for the on/off switches for the conscious state, as far as we know. For humans, it's the cortex that's the most interesting place for the CONTENTS of consciousness. The evidence for that is overwhelming.

There's a territorial dispute over different parts of the brain wrt [with respect to] consciousness. Sometimes it's a useful debate, but a lot of the time it's not. I don't think this version of "it's my piece of the brain!" is all that useful.

We want to keep an open mind, obviously. The reticular formation is very interesting, and my good buddy Bjorn Merker has made a case for the zona incerta. Jaak Panksepp, another wonderful scientist, puts in the peri-aqueductal gray (PAG), which wraps around the tiny tube that feeds fluid into the brain and

spinal cord, the aqueduct. The PAG is known to be important for mother-child attachment, and I think for oxytocin, the "trust" hormone. All really important stuff.

But still, I think in humans these factors all converge on the cortex. It's not either-or, because there [are] so many evolutionary layers. Consciousness dates back at least to the early mammals (200 million years ago), and probably much more widely.

That means there are many layers in the brain that are involved. Again, the best and more direct evidence points to cortex as a "terminus" or "brain substrate" for consciousness --- so far.

In other animals, there is some evidence that deeper structures may provide conscious contents. I have not seen evidence for that in humans.

So there! The trick is to keep your balance on the big flow of evidence, to stay open minded, but not so much that you can't tell where the evidence is pointing...

Best wishes,
Bernard ²⁹

Above, Baars' wrote: "What they are saying --- incorrectly --- is that consciousness is in the brainstem. That is only true for the on/off switches for the conscious state, as far as we know." First, Baars' view appears to be mostly binary in regard to the brainstem containing on/off switches. While Baars has many peers who agree with this way of looking at the brainstem, I believe this view is incomplete. From strictly a mechanical point of view they might be correct, but because there is no single formula known that switches on to off and off to on, I believe this view is unreliable and incomplete. The only "off" switch we know of, is when a lesion or other damage has occurred to induce comatose or vegetative states, and even then some evidence of consciousness can be tracked, as we will see later in the Rom Houben story. Second, Baars' comment: "For humans, it's the cortex that's the most interesting place for the CONTENTS of consciousness. The evidence for that is overwhelming." In many

respects, it is easy to see Baars and his peers' point of view. Neuroscientists are working with what they can most easily see using fMRIs and the like. There is a lot of activity in the cortex, but just because there is an abundant level of activity observed, does not mean that is where the CONTENTS of consciousness live. I wonder about what is not easily seen. It appears that Baars does not really agree with me on either point. I believe more is happening in the RAS than what is currently and confidently known. In my opinion, these views of Parvizi, Damasio and Baars all have a limited perspective of consciousness, so far.

This image (Figure 15), taken from Parvizi and Damasio's paper, is used here to illustrate the zones or nuclei formations, which comprise the brainstem, as they view its sections. I use their image to elicit and demonstrate the mechanical view Parvizi and Damasio took in their analysis. This flattened image does not honor the multi-dimensional aspect ratios, nor does it give a sense of interplay of these structures, whereas the following illustration (Figure 16) depicts the placement of these nuclei more anatomically.

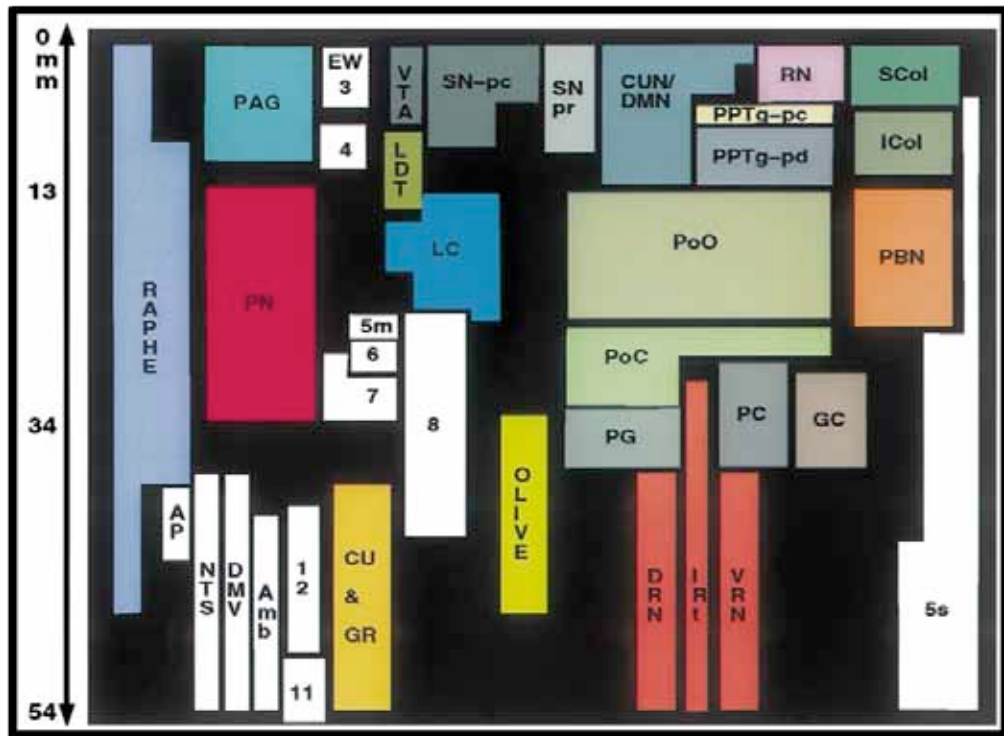


Figure 15.³⁰ **Flattened view of the brainstem**

The text below serves as a legend to this image Parvizi and Damasio featured in their 2001 paper.

The heterogeneous collection of brainstem nuclei: The brainstem gray matter, including the region traditionally known as the reticular formation, is organized in nuclei. There are two sets of nuclei, one on each side of the brainstem. Here only the collection of nuclei on one side of the brainstem is shown. A nucleus is a three dimensional collection of neurons which is usually aligned in parallel to the long axis of the brainstem. As this figure illustrates, each nucleus has its own idiosyncratic position within the brainstem. Some extend throughout the entire brainstem (such as the trigeminal nucleus, 5s) whereas some others (such as the area postrema, AP) occupy a small region and extend only a few millimeters or less. The size and the shape of the columns, as shown here, reflect the relative area of the brainstem occupied by the nucleus. Abbreviations: 3: oculomotor; 4: trochlear; 5m: trigeminal motor; 5s: trigeminal sensory; 6: abducens; 7: facial; 8: vestibulochoclear; 12: hypoglossus; Amb: ambiguus; AP: area postrema; CU and GR: cuneate and gracile; CUN/ DMN: cuneiforme and the deep mesencephalic; DMV: dorsal motor nucleus of vagus; DRN: dorsal medullary reticular complex including the region of the subnucleus reticularis dorsalis; EW: Edinger±Westphal; GC: gigantocellularis; ICol: inferior colliculus; IRT: Intermediate reticular zone; LC: locus coeruleus; LDT: laterodorsal tegmental nucleus; NTS: nucleus tractus solitarius; OLIVE: olivary complex; PAG: periaqueductal gray matter; PBN: parabrachial nucleus; PC: parvocellular; PG: paragigantocellular; PoC: pontis caudalis; PoO: pontis oralis; PPTg-pc: pedunclopontine tegmental nucleus pars compacta; PPTg-pd: pedunclopontine tegmental nucleus pars dissipatus; RN: red nucleus; SCol: superior colliculus; SNpc: substantia nigra pars compacta, SN-pr: substantia nigra pars reticulata; and VRN: ventral reticular complex.³¹

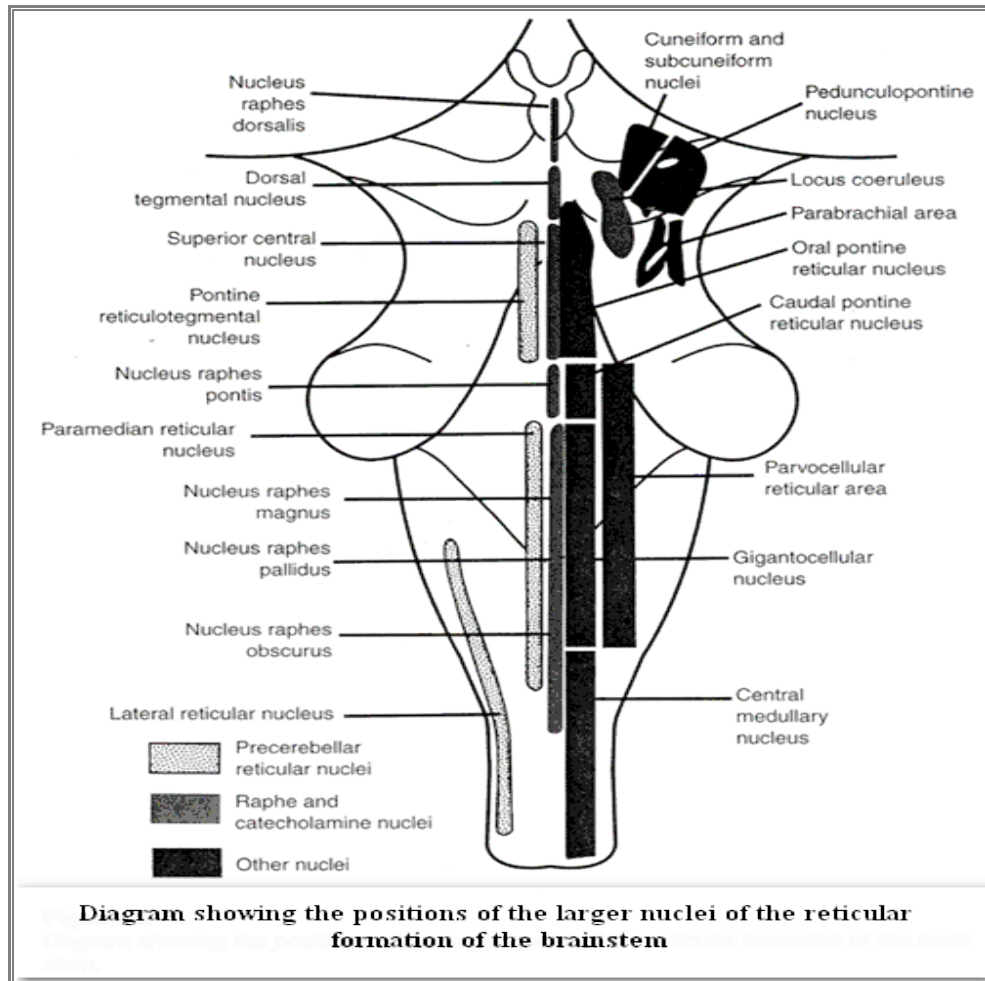


Figure 16.³² **An anatomical diagram showing the positions of the larger nuclei of the reticular formation**

This anatomically correct image supplies a different view of the brainstem structure and its important and relevant multi-dimensional overlap.

The late Dr. Josephine C. Moore was a professor of anatomy at University of South Dakota Medical School. Moore was an occupational therapist who specialized in modeling the sensorimotor-sensory development in prenatal, perinatal and neonatal stages. Her work influenced behavioral modification programs and the instructions given to parents of focus-challenged children. Moore described the functions of the reticular formation of the brainstem as the Four As: asleep, awake, alert and attending. She further

explained that the Reticular Activating System is both the regulator of cell threshold and the rhythm generator (circadian and other rhythms of the nervous system).³³ Moore suggested that various areas of the neuroaxis (points which emanate from the brainstem) are vulnerable to insult at different gestational ages, and that the major reasons why some areas are more susceptible to insult than are others. Moore posits that functional deficits resulting from the more common types of central nervous system lesions and suggests that the deficits that follow may or may not be overtly expressed in the developing infant or later in life. She believed many neuropathologies and neuromotor disorders, including disorders in the development of movement and posture, the visual-vestibular-cervical triad, and the overall function of the major CNS systems, stemmed from this neuroaxis of the brainstem.

CHAPTER 3: THE HISTORY AND DISCOVERY OF THE RETICULAR FORMATION AND RETICULAR ACTIVATING SYSTEM

In May of 1957 Scientific American published the first American article on the reticular formation, written by J.D. French. The introduction of the article read, “This recently discovered network of cells in the brain has many vital functions, notably arousing and maintaining consciousness and choosing between important and unimportant sensory messages.”³⁴ Dr. French, though a leader in the field of neuroscience himself, was reporting on the work of eminent physiologists Giuseppe Moruzzi and Horace Magoun that had begun about eight years earlier. At Northwestern University, Moruzzi and Magoun discovered the fact that the reticular formation of the brainstem aroused the cortex of the brain. Earlier experiments by Moruzzi, Magoun and others had shown that, “A sensory signal arriving at the cortex while [someone] is asleep goes unrecognized. Experiments on anesthetized individuals have shown further that the stimulation of the cortex alone is not sufficient to awaken the brain. Something else must arouse the cortex; that something is the reticular formation.”³⁵ Specifically, it is the Reticular Activating System. Moruzzi and Magoun decided the reticular formation acted as a gate or switch that aroused the cortex. They named this area of the brainstem the Reticular Activating System (RAS). Together their work cleared up many mysteries regarding external and internal sensory signals. A signal may be external, that is, triggered by a stimulus in an organism’s environment (e.g., waking to escape a burning house). On the other hand, a signal may be in response to an internal stimulus (e.g., waking to void the bladder). This internal sensing is known as *interoception*, a topic we will return to shortly.

The timing of this Scientific American article is important because, despite decades of research previously done in Europe, not much attention was paid to the reticular formation for the potentially vital role we now believe it plays in cognition and consciousness. More details on these various subjects will be covered in depth later.

According to some medical historians, by the 1860s the structures of much of the brain tissues were fairly well identified, though the nervous tissues and grey matter remained puzzling for several more years. Around 1867 Joseph von Gerlach announced his *reticular theory*. Gerlach's *reticular theory* asserted that the brain's nervous system consisted of processes of contiguous cells fused (my underline) to create a massive continuous meshed network.³⁶ *Reticulum* is Latin for "net". While it was debated among his peers, the reticular theory predominated until the 1890s. The reticular formation began to receive global attention in 1906 when Santiago Ramón y Cajal of Spain and Camillo Golgi of Italy won the Nobel Prize in Physiology and Medicine in recognition for their work on the structure of the nervous system. As a result of Golgi's careful and inventive work staining neurons, Cajal realized that the brain was composed of individual cells (neurons) and was not a continuous net (reticulum) (my underline) of fibers as was believed by Gerlach.

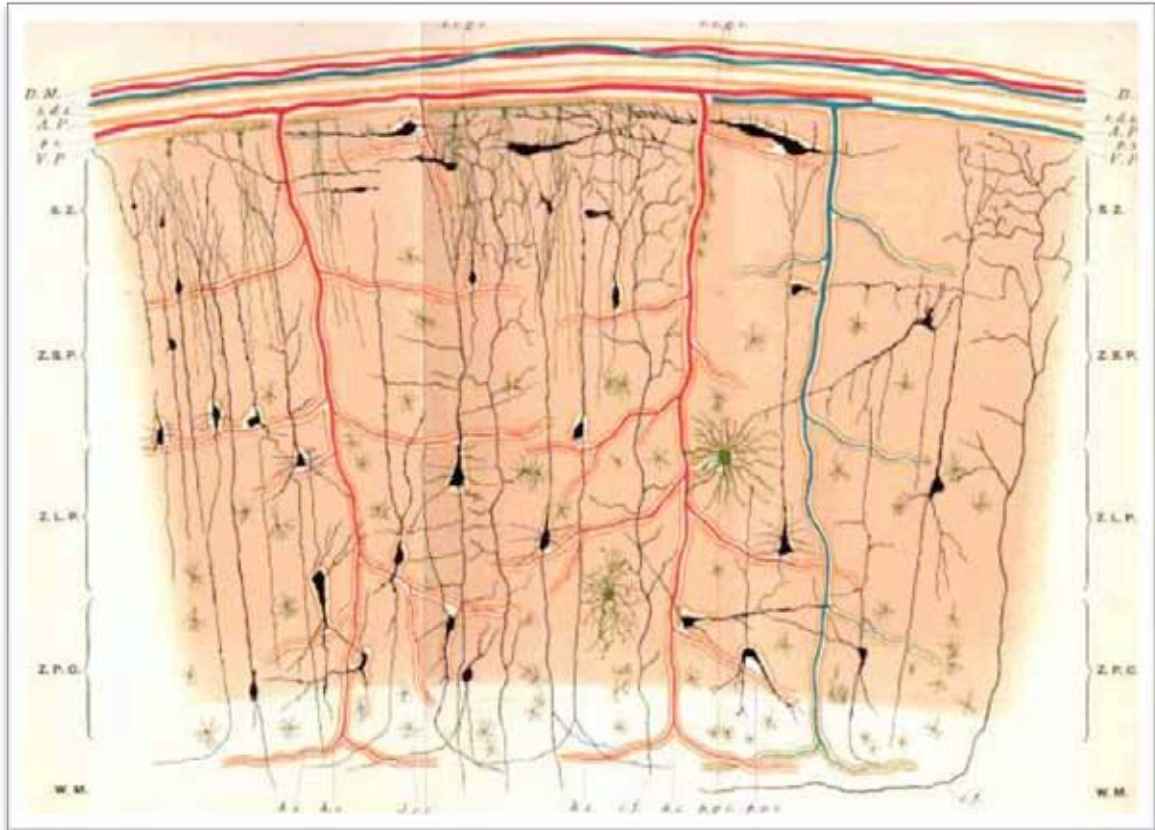


Figure 17.³⁷ **Golgi stained neural cells**

Golgi stained neural cells in the layers of the cortex (based on plates by Ramón y Cajal, et al) showing large and small Pyramidal cells (black) with their vertical processes, Stellate cells (green), Horizontal cells (black, upper layer) whose processes transit across the cortex and afferent processes from deeper in the brain (generally via the thalamus).³⁸ Notice the layers or zones as discussed earlier.

Cajal observed the extensive and multiple branches of the neurons of the reticular formation as they traversed the middle of the brainstem, called the raphe nuclei. Raphe nuclei (Figure 14) are the most midline formations of the reticular formation. It is worthy to note that the raphe nuclei are implicated (along with the substantia nigra) in disorders such as Parkinson's disease. Prior to Cajal and Golgi's studies and the work of others, the reticular formation was characterized as being "poorly organized and served only primitive functions."³⁹

Despite Cajal's breakthrough understanding, the reticular formation induced little interest from researchers until the electrophysiological studies by Moruzzi and Magoun. Through the late 1940s and early 1950s, Moruzzi and Magoun demonstrated that the maintenance of consciousness and alertness depended on input from sensory pathways traversing the brainstem reticular formation to the thalamus and cerebral cortex.⁴⁰ Collectively these discoveries introduced the sensory links to the environment and the motor impulse responses in animals and humans alike.

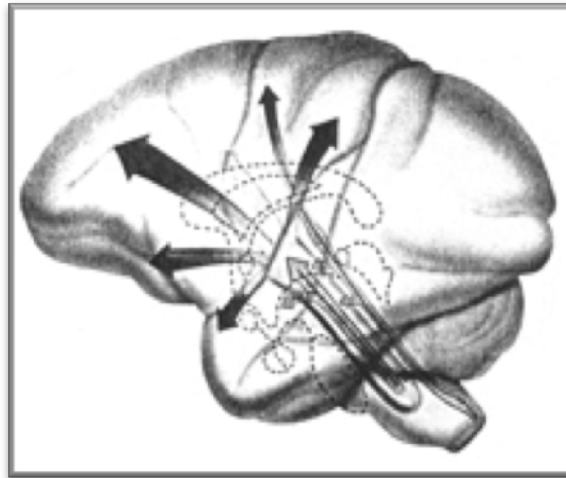


Figure 18.⁴¹ **Lateral view of a monkey's brain**

This image depicts the lateral view of monkey's brain showing the ascending reticular system in the core of the brain stem, receiving collaterals from an afferent pathway and projecting widely to cortical areas.⁴²

Using electroencephalograms (EEG) on humans and primates, Moruzzi and Magoun defined the concept of "arousal" as functionally conscious. In a general sense, they estimated that *arousal* makes reference to global states of the brain throughout stages of sleep, awake, alert awareness, lethargic awareness and coma. In addition to demonstrating the RAS as a gate to alertness, they found each of these states had its own

frequency wave pattern measurement in the EEG spectrum. Today (2010), these levels of frequency patterns are referred to as delta, theta, alpha, beta and gamma.

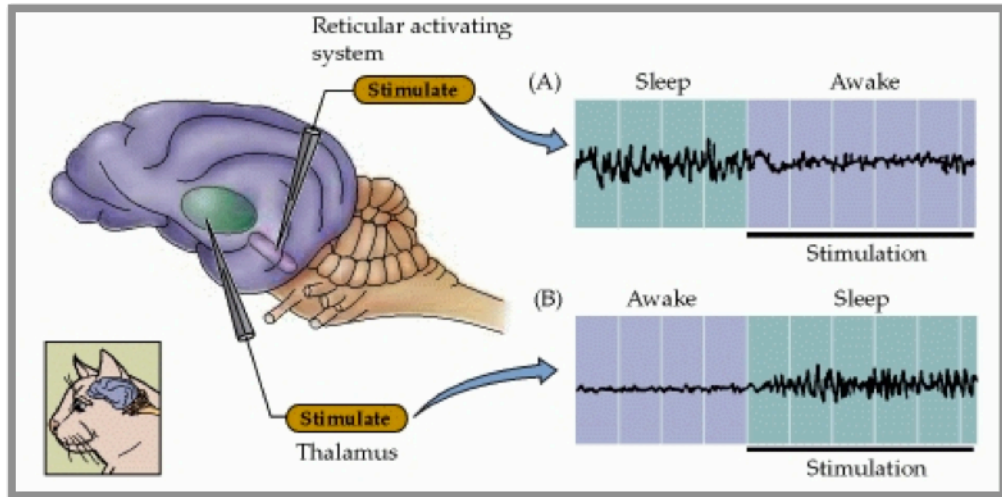


Figure 19.⁴³ **Activation of specific neural circuits triggers sleep and wakefulness**

This image (Figure 19) depicts that activation of specific neural circuits triggers sleep and wakefulness. (A) Electrical stimulation of the cholinergic neurons near the junction of the pons and midbrain (which includes the RAS), causes a sleeping cat to awaken. (B) Electrical stimulation of the thalamus causes a wakeful cat to fall asleep. This graph shows EEG recordings before and during stimulation.

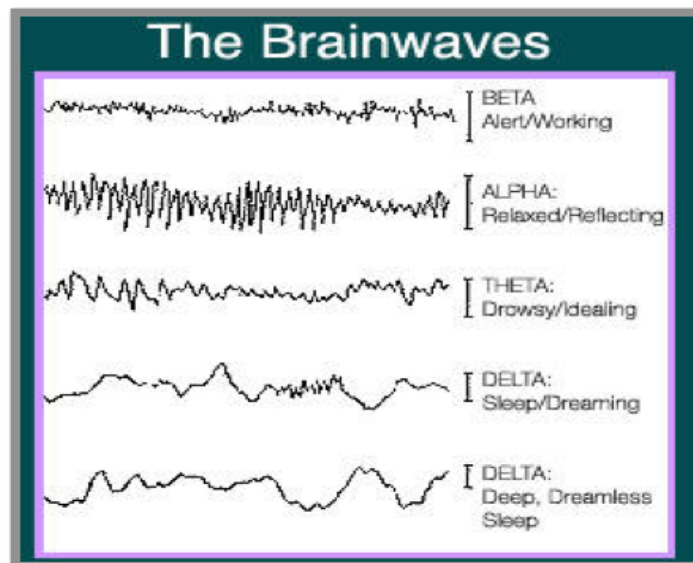


Figure 20.⁴⁴ **A chart of the typical brainwave patterns in humans**

Measuring frequencies of brainwaves in various states of arousal provides but a small, if any, part of the large puzzle regarding the RAS. “Since Magoun and Moruzzi, and their co-workers first focused their attention on the importance of the reticular formation, this system has been expanded to include not only the nonspecific thalamic nuclei, but also gray matter in the diencephalon [hypothalamus and thalamus], the septal region and the amygdala [part of the limbic system], with reverberating circuits having a potential complexity that makes the UNIVAC machine⁴⁵ appear a simple mechanism by comparison.”⁴⁶ Indeed, by comparison with modern computer systems, the 1958 UNIVAC model was a very simple machine. Today, in year 2010, because of advancements in science and in computing power, we have made enormous strides in cognitive and consciousness studies. As a result, we have the ability to enhance and exact observables, build artificial intelligence and construct robotic machinery. The work of these scientists (Magoun, Moruzzi, et al.) spawned a new field in behavior sciences, experimental psychology and experimental psychiatry. Identifying the RAS and stimulating cortical regions offered a scientific platform for studying the dynamics of behavior and learning more about various states of consciousness.

It appears that Magoun and Moruzzi’s concept of global arousal of the brain to various levels of consciousness pushed scientists to look specifically at cortical and region-specific brain functionality. Many theories have been postulated, but few are more referenced than the Global Workspace Theory (GWT) as proposed by Dr. Bernard Baars in 1983, while at The Neuroscience Institute in San Diego, California. By training, Baars is an experimental psychologist and a professor at the Center for Consciousness Studies at the University of Arizona. He continues work on this puzzle of human

consciousness and finds support of his hypothesis, that human cognition is implemented by a multitude of relatively small, special purpose processes, which are almost always unconscious. According to Baars' theory, such non-conscious experiences are processed locally within separate regions of the brain, i.e., the visual cortex, amygdala, thalamus and hypothalamus and frontal cortex. This proposal was followed up by his work titled *In the Theater of Consciousness: The Workspace of the Mind*, which uses the metaphor of a spotlight on a stage to represent a singularly focused state. "The bright spot reveals the contents of consciousness, actors moving in and out, making speeches or interacting with each other. The audience is not lit up; it is in the dark (unconscious) watching the play. Behind the scenes, also in the dark, are the director (executive processes), stagehands, scriptwriters, scene designers and the like. They shape the visible activities in the bright spot, but are themselves invisible."⁴⁷ Baars further explains, "Only the bright spot on stage is conscious (because consciousness is very limited in capacity)."⁴⁸ I would argue, that both *alert* and *focused* consciousness have a limited capacity, but that consciousness is ubiquitous and always 'on'. Thinking of consciousness as ubiquitous allows for a possible explanation of some counter-rational phenomena in science, such as blindsight, which is discussed in coming paragraphs. Depending on personal experience and interpretation of such experience, the prospect of encountering 'ubiquitous' consciousness exists in various levels of sleep and wake states. For example, lucid dreaming, daydreaming, premonitory and drug-induced experiences, nightmares, hypnosis and ritual trance states are some ways in which the opportunity to experience altered states of consciousness and Consciousness may exist. Recall from the introduction, that I use lowercase "c" and uppercase "C" to elicit differential types of

consciousness; lowercase “c” depicts the local in-body consciousness; uppercase “C” Consciousness is expanded to include Spirit and connection to the Divine – what may be the sensation of inspiration.

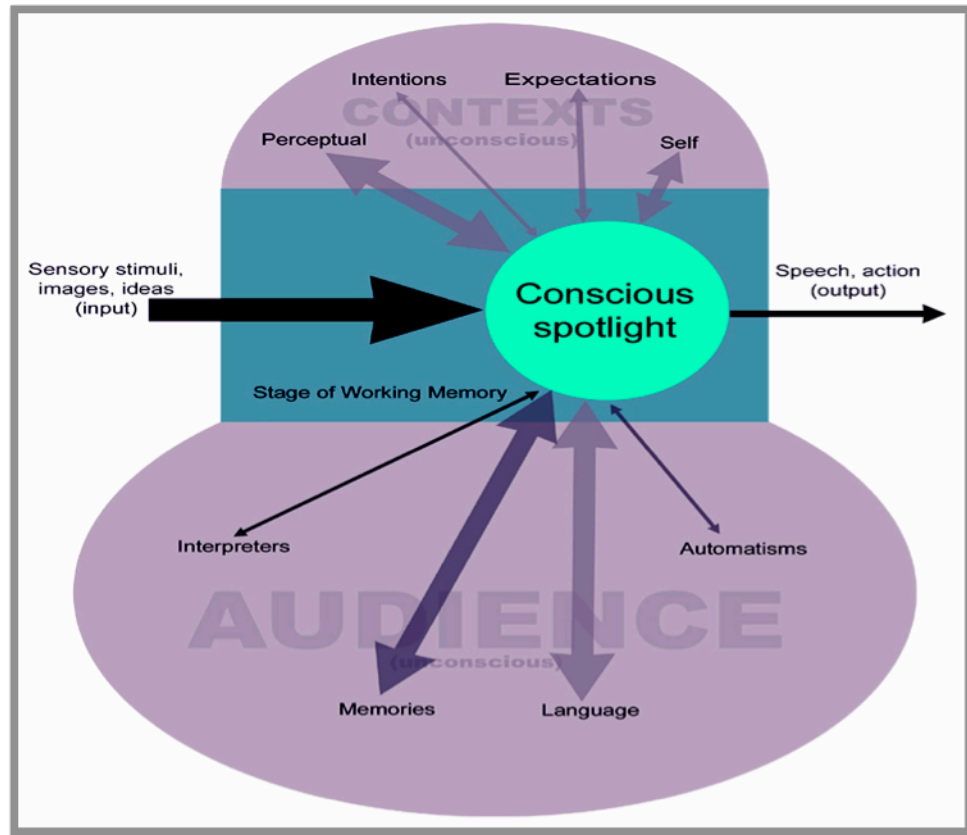


Figure 21.⁴⁹ **Dr. Bernard Baars Global Workspace Theory “spotlight”**

This image is used in Dr. Baars’ tutorial on GWT. According his Global Workspace Theory, “Only the bright spot on stage is conscious (because consciousness is very limited in capacity).”⁵⁰

According to Baars’ theory, sensory inputs compete for access to the conscious bright spot, as do output directions. The "theater stage" corresponds to working memory, while “all other parts are unconscious, including long term memory, the automatic processes of language and events going on backstage. The capacity of unconsciousness is enormous.”⁵¹ This idea of “the capacity of unconsciousness as enormous” supports the

notion of our consciousness as ubiquitous. Here I am speaking of the local domain of consciousness, which spans across normal sleeping and waking states. It appears to me that most neuroscientists mix cognition and consciousness together. I use the word ubiquitous here to be inclusive of the brain's activity, the body's awareness of the surrounding environment (proprioception), and etheric energy perceptions (whether cognitively registered or not). The internal inner functions of the body (interoception) usually occur without our conscious focus, yet they are always on. Death removes the ubiquity of consciousness from the local domain, the physical body. In an effort to bridge future discussions regarding cognition and consciousness, I believe we need to recognize that consciousness also exists beyond the cranium, and to also recognize the limits of scientific investigations regarding consciousness.

The theater metaphor has been turned into several testable models, but a lack of compelling evidence caused the GWT to languish for the past fifteen years, until Stanislas Dehaene updated Baars' model with the most recently proposed brain wiring schemas. Dehaene directs the INSERM – Institute of Health and Medical Research Cognitive Neuroimaging unit in Orsay, near Paris. His work uses advanced techniques of functional Magnetic Resonance Imaging (fMRI), electroencephalography (EEG), intracranial electrodes, and psychological manipulations to study how culture and biology interact in the human brain. Dehaene is renowned for his work on the neural bases of mathematical abilities, and also for his studies of reading, multilingualism, and consciousness. Years earlier, Dehaene's team had already shown that distant areas of the brain are connected to each other, and that these connections are especially plentiful in the prefrontal, cingulate and parietal regions of the cortex. These areas are involved in

reasoning, critical thinking and planning. In 2005, Dehaene's team put the Global Workspace Theory to the test by studying a phenomenon known as *inattention blindness*, in which a subject fails to see things that are right before their eyes. Essentially, they teased out data from two strings of letters, which were shown in quick succession to the participants. "For the first 270 milliseconds the neural activity was roughly the same in both cases. After that, there were stark differences. The neurons quickly stopped firing if the letters were perceived unconsciously. But when the subjects were conscious of the letters, the neurons in a number of the brain regions thought to be part of the *global workspace*, including the frontal and parietal lobes exploded into synchronous activity... This explosion of coordinated activity was just what Baars had postulated, corresponding to the widespread 'broadcast' of signals across the global workspace that he predicted would accompany conscious perception."⁵² By "perceived unconsciously," the authors appear to indicate a stimulus that was registered by the brain, yet not reported as perceived by the subject. These results substantiate a belief that we perceive more fully than previously thought possible -- meaning that the factors of awareness are attuned to the environment and constantly adapting, whether or not they are cognitively recognized -- hence, consciousness may be considered as ubiquitous.

I insert here a personal belief -- our perception extends beyond what is scientifically measurable at this time. We know that the autonomic nervous system processes a majority of our bodily functions without conscious awareness of doing so. Essentially all branches of the nervous system are life preserving in their function. The importance of this Global Workspace Theory being teased out of complex neurological studies is that it might help us understand a phenomenon called *blindsight*, which may, in

turn, help us to better understand more subtle energy phenomena as well. The Millodot Dictionary of Optometry and Visual Science defines *blindsight* as “a term used to indicate someone who is totally blind but yet is able, unconsciously, to locate an object on the basis of visual cues. It indicates a lesion which has destroyed the visual cortex but in which the retinotectal pathway to the superior colliculus remains unaffected. This pathway is not involved in conscious vision but receives some information from the retina.”⁵³ Lawrence Weisrantz, a British psychologist, discovered the phenomenon of blindsight, which he describes as the voluntary visually-evoked response to a stimulus presented within a scotoma (a blind spot or blind area in the field of vision). Weisrantz has collected approximately thirty-five years of case studies, which reveal blindsight subjects have no awareness whatsoever of any visual stimulus, yet are able to predict, at significant levels, aspects of visual stimuli such as location or movement of objects in their surroundings.

This discussion may seem like a departure from the text regarding RAS history and function. But it is important because of the varied tracks in which science is pursuing the answer to questions regarding conscious awareness. Phenomena such as blindsight, remote-viewing, how human thought affects random event generators (REG), how human thought-forms travel, psi and such must remain in the discussion, as I believe they play a major role in how we, as humans, interact with our environment. Is our perception based solely on focus? That which is perceived peripherally is still perceived, it gets registered somewhere. I suggest that so long as we live in these bodies, we are “on” and can perceive at both conscious and unconscious levels. The evidence supporting the Global Workspace Theory model, including thirty-five years of

documented blindsight cases, might reveal other layers of consciousness for our exploration. Though fMRIs do not yield clear images of the reticular formation, we know from our discussion of the anatomy and function of the brain that this area is involved with almost everything the body is experiencing, internally and externally.

The third edition of *Neuroscience in Medicine*, a commonly used medical textbook, states, “Current evidence reveals that the reticular formation provides an important matrix for neural integration. . . .it is evident from numerous recent research reports that subgroups of reticular neurons and nerve terminals contain specific combinations of transmitter and peptides, such as serotonin, norepinephrine, acetylcholine, dopamine, glutamate, gamma-aminobutyric acid (GABA) and enkephalin, suggesting that reticular formation functions also depend on complex neurochemical interactions. . . .reticular formation circuits, in concert with limbic and hypothalamic inputs, regulate cardiovascular and respiratory rhythms and other visceral responses through connections with autonomic centers in the spinal cord. Together the reticular formation circuits participate in regulation of processing internal and external sensory information, including emotions and behavior.”⁵⁴ This physiology is explained in Oliver Cameron’s discussion of interoception, which picks up the work of Claude Bernard, Walter Cannon and others from over one hundred years ago. Oliver Cameron MD, PhD, is a Professor of Psychiatry at the University of Michigan Medical School and a past president of the Psychosomatic Society. He is a current member in several societies dedicated to driving the studies of Psychoneuroendocrinology and Biological Psychiatry. Cameron writes extensively on the subject of interoception in his book titled *Visceral Sensory Neuroscience: Interoception*. Cameron states, “There are several ways in which

the control of hormonal systems is of probable relevance to interoception. First, the tone of the body (e.g., metabolic effects of thyroid hormone on heart function) probably affects visceral sensory feedback. Second, hormonal changes are involved in most all or all motivated effects. Third, hormonal changes, especially those from the adrenal cortex (cortisol in humans) and medulla (adrenaline), occur almost always in association with stress and various emotional changes (especially aversive reactions).”⁵⁵ The known pathways involved in these feedback loops are the Ascending Reticular Activating System (ARAS), hypothalamus and amygdala.

Many years have been spent finding areas in the brain that are correlated to function and memory, such as Broca’s area for speech, Wernicke’s area for auditory recall and several areas relating to vision coded as V1, V2, and so on. While this is certainly necessary and helpful, especially in treating illness or trauma, it appears that we are still separating mind from body in science and becoming more myopic rather than expansive in our views. I believe we must be careful that a strategic myopic focus does not limit our scope of what potential causes and effects are taking place.

If a bridge is to be built linking what the Western Cartesian scientists assert to be true of the visible world, and what parapsychologists and other scientists demonstrate to be true, (with statistically significant results) of the invisible world – it needs to be done with the arms of both camps out-stretched. A bridge cannot be constructed from only one end. The middle construction of such a bridge, I propose, must be accomplished through a synthesis of the two worlds -- visible and invisible (e.g., inattention blindness and blindsight). This will require courageous scientists of vision and persistence, who are

able to live and work comfortably in two worlds (the seen and unseen), though it may bring doubt and ridicule from colleagues in either camp.

Interpretations of data collected in either world will be filtered through various perceptions and beliefs. It has been said, “seeing is believing.” It is also becoming ever more apparent that “not believing is not seeing.”⁵⁶ Perhaps it is time to leave the realm of *either/or* arguments and relax into creative discussions of *and/both*. In his classic *The Tao of Physics*, Fritjof Capra says, “The rational part of research would, in fact, be useless if it were not complemented by the intuition that gives scientists new insights and makes them creative.”⁵⁷

Toward the end of his illustrious career, E. Roy John of the Brain Research Laboratories at New York University School of Medicine wrote this abstract to his article, *The Sometimes Pernicious Role of Theory in Science*, where he summed up the game of theories in science:

The role of theory in science is discussed in the context of understanding brain function. Historically, theories of brain functions have oscillated between localization and anti-localization beliefs. In the last 50 years, the important discoveries of the ascending reticular activating system (ARAS), feature extracting neurons and synaptic growth led many to orthodoxy. Research became more and more focused upon the elements comprising the nervous system and their interconnections. The mainstream belief became that many brain functions including consciousness were localized, certain kinds of brain injuries produced irreversible functional deficits. Contrary scientific challenges were discouraged by the omnipresence of such theory. Examples of theoretical “Einstellungen” (approach) in the areas of ARAS, coma, treatment of brain injuries and consciousness are given, as well as signs that the pendulum is swinging back to an approach to the system as a whole rather than a focus on its parts.⁵⁸

Dr. John’s obituary summarized his contributions most clearly: “Dr. John's then-heterodox model uses deviations from a ground state as evidence that distributed networks are fundamental to consciousness, memory and functional brain disorders. A

later article, using an animal model, presented overwhelming evidence that memory is distributed throughout the entire brain.”⁵⁹

One of the key elements to take away from this discussion is that, no matter how science may try to separate out parts and identify autonomous functions, ultimately that is not possible. Our human system is both an open and closed system. We are closed in the sense that we are essentially a bag of water, an in-vivo milieu held together by bones, joints, muscles and connective tissues, linking together in form and/or function. From the time the umbilical cord is cut, our internal milieu must be maintained within a very narrow range of temperature, pH and a number of other parameters. Yet we are an open system as well with respect to the environment that surrounds us – as our skin breathes and nervous systems responds, and we both take in and eliminate materials from the world around us. This happens at the cellular level as well.

CHAPTER 4: WHAT IN THE HUMAN TERRAIN IS THAT?

“Complex systems do not forget their initial conditions: they carry their history on their backs.” --- Ilya Prigogine

Some of the most fascinating aspects of our study of the brainstem are: 1) how each of the neurotransmitters and other biogenic amines (e.g., cholinergic, noradrenergic, monoaminergic and adrenergic amines) translates messages throughout the body; 2) how the body's needs trigger behaviors; and 3) how behaviors may shape the brain and body. Neurotransmitters, peptides and hormones (sometimes collectively called ligands) work in and through the internal systems of the body, and act in concert with what is experienced in the external world – our environment. Claude Bernard (1813-1878) was a founder of modern experimental physiology and one of the most famous French scientists in the history of medicine. Today, Bernard is remembered for his concept of equilibrium, an idea that formed the underpinnings of the concept of homeostasis, the consistency of the internal environment. Despite the fact that he was a prominent scientist, Bernard's concepts had very little public impact during his lifetime. Although Bernard is more widely acclaimed in the scientific community, it is likely that the public fame and success of Louis Pasteur, a student of Bernard, was due to Pasteur's discoveries related to infectious diseases, which were prevalent at the time.

Bernard advocated that health was due to equilibrium in the *milieu interieur* and preserved by “a continuous and delicate compensation, established as by the most sensitive of balances.”⁶⁰ Bernard asserted a major breakthrough in understanding of the fundamental principles of organic life. Among his many important discoveries, Bernard found that the body regulates its temperature through constriction and dilation of blood

vessels (the vasomotor control system). Among his important theories is that the vagus nerve is instrumental in maintaining the balance of the internal milieu.⁶¹ The evidence that Bernard uses to support this theory is based on his observation of sympathetic nervous system responses to temperature changes within the body. Bernard rejected the idea of the brain as a separate system, vehemently asserting, "...the brain is a bodily organ that ... digests impressions and ... secretes thought."⁶²

In Bernard's 1857 classic work titled, *An Introduction to the Experimental Study of Medicine*, he illustrates two important operative principles of science and experimentation.

On the basis of a prevailing theory and of earlier observations I had been led...to make the hypothesis that the temperature should be reduced...after severing the cervical sympathetic nerve in the neck... The result was...precisely the reverse of what my hypothesis, deduced from theory, had led me to expect; thereupon I did as I always do, that is to say, I at once abandoned theories and hypothesis, to observe and study the fact itself... Today my experiments on the vascular and thermo-regulatory nerves have opened a new path for investigations and are the subject of numerous studies which, I hope, may some day yield really important results in physiology and pathology. This example...proves that in experiments we meet with results different from what theories and hypothesis lead us to expect...this example... gives us an important lesson to witness: without the original guiding hypothesis, the experimental fact which contradicted it would never have been perceived...Indeed I was not the first experimenter to cut this part of the cervical sympathetic in living animals...But none of them noticed the temperature phenomenon...though this phenomenon must necessarily have occurred... The hypothesis...had prepared by mind. However, it could not be simpler to perceive, and since I described it, every physiologist without exception has noted and verified it with greatest ease.⁶³

Bernard's emphasis on the milieu interieur consistently noted the remarkable constancy of the internal environment, and on the ability of that environment to defend and protect itself from the conditions of the *milieu exterieur*, in which the organism lives. Bernard believed that keeping equilibrium within the internal environment meant that, despite how extreme the external conditions might be, the dynamic uniformity of the

conditions of life were based on the compensatory stability of an organism. What eventually catalyzed this understanding was a comparison of ionic water concentrations within body fluids of salt and fresh water animals. The fresh water animals had less salt concentrations in their internal environment than had the salt-water animals. This may seem self-evident now, but at the time of Bernard's study of this evidence raised the understanding that the external environment affected the internal environment.

A brief discussion of Claude Bernard's contributions states, "In the second half of the [19th] century the view that cells were the fundamental building blocks of structure and function in the organism was a new concept, as proposed by scientists such as pathologist Rudolf Virchow, and neuroanatomists Camillo Golgi and Ramón y Cajal. Claude Bernard added the physiological thinking to the cell doctrine. Bernard's prolific experimental investigations were also responsible for correlating nervous action with the control of metabolism, circulation and respiration, thus introducing the revolutionary concept (for the time) of feedback control loops, or how certain systems work as homeostatic devices. This gave birth, a hundred years later, to cybernetics, the science of system control."⁶⁴ Through Bernard's research and tutelage of Louis Pasteur and Antoine Béchamp, they collectively coined the term *Terrain*, from the Greek word for "soil."

An antecedent to Bernard's concepts may lie in the humoral theory of Greek medicine. The word humoral derives from the word humor, which, in this context, means fluid. The humoral theory was one of the fundamental principles in Western medicine from antiquity through the 19th century. According to humoral theory, the human body

was thought to include a combination of four humors: black bile (also known as melancholy), yellow or red bile, blood and phlegm. The philosophy underpinning the humoral theory is that each individual has a particular humoral makeup, or “constitution,” and health was defined as the proper humoral balance for that individual. An imbalance of the humors resulted in disease. The humoral theory also included four temperaments, which were comprised of personality attributes. These were melancholic (tendency towards perfectionism, sadness, depression and creativity), sanguine (sensitive, compassionate and extroverted), choleric (charismatic, but be quick to anger) and phlegmatic (kind, mostly taking neutral positions, dependable). The humoral theory blended behavior and physiology. Today this theory might be called mind-body or holistic medicine, reflecting the concept that physical health, emotions and personality are part of the same whole.

Despite having the same teacher, Louis Pasteur and Antoine Béchamp were rivals until Pasteur’s death. It has been recorded by numerous sources that Pasteur, at the time of his death, announced, “Béchamp was right, the germ means nothing, the terrain is everything.” Until this admission, Pasteur had believed in *monomorphism*, that is, that bacterium and other microbes have only one form. Pasteur did not believe that bacteria reverted to another form (or “the invisible world”), or that the bacteria had any organization or intelligence. Carrying Bernard’s work forward, Béchamp asserted the concept of *pleomorphism*, which postulates that microbes alter their form in response to conditions in their environment (the terrain) and appear as different germs, bacteria, fungi, and viruses. This discovery was supported by the work of many scientists who appeared later (i.e., Bayliss, Haldane, Barcroft, Sherrington). The discussion of terrain

continued for years, but did not gain support due to the scientific community's focus on Pasteur's monomorphic model. Today, however, pleomorphic principles are imbedded in the practice of biological medicine, which in the last two decades has gained credibility with the use of live blood analysis and dark-field microscopy. The components of biological medicine are beyond the scope of this discourse, but it is relevant to reflect on the various twists and turns made over time in our science-driven search for answers. Sometimes it is necessary, for the purpose of testing accuracy and relevancy, to look back at what scientists have observed with the fresh perspective afforded to us by the modern era's creative intelligence. In 1932, seventy-five years after publication of Bernard's only major work, Walter Cannon introduced the concept of *homeostasis* to the complex internal and external balance referred to by Bernard as equilibrium. Cannon's concept of "homeostasis," or controlled stability of the internal environment supported Bernard's work. However homeostasis might be more accurately termed "homeodynamic." Bernard stated in his opening lecture in a course in general physiology given at the College de France in 1887:

"The living body, though it has need of the surrounding environment, is nevertheless relatively independent of it. This independence which the organism has of its external environment derives from the fact that in the living being, the tissues are in fact withdrawn from direct external influences and are protected by a veritable internal environment which is constituted, in particular, by the fluids circulating in the body."⁶⁵

Leonard Johnson's modern day textbook describes human physiology in these terms: "Living things are open systems. Maintaining a constant internal environment would pose no problem if living things were closed systems, like a solution in a sealed bottle. Instead, however, all freely living forms are open systems constantly exchanging

matter and energy with the environment. The remarkable thing is that despite this constant exchange, essential for life [my underline], the compositions for our intracellular and extracellular fluids are maintained remarkably constant; this is what homeostasis is all about.”⁶⁶

I summarize and close this section by returning to my preference for the use of *homeodynamic* over *homeostatic*. I believe *dynamic* better represents the lack of *stasis* in health. This statement is not intended to dislodge an embedded medical term, but simply to recognize that homeostasis is in truth, a dynamic process, and that various physiological parameters can be biologically idiosyncratic. *Stasis* is defined as a slowing or stoppage of the normal flow of a bodily fluid. Our bodies are constantly regulating pressure, pH and temperature to name only a few activities under constant change.⁶⁷

For the textbooks like Johnson’s quoted above, I appreciate the notions of achieving balance and maintaining balance, but I find the common use in clinical applications may be on track with the reductionists. Analyzing live blood under a microscope allows us to see that there is nothing static about living organisms. I would like to make an important distinction here -- homeodynamic is neither a scientific measurement, nor a term used in most clinical practices, though I suppose we should consider it. Homeodynamic is like consciousness; it is on going and constantly in process. Our bodies are wired for self-preservation, and survival is a primary component of the nervous system’s job. Dr. Daniel Miller, who is a practicing psychologist and author of *The Web and The Cloth: Science Consciousness and Homeodynamics*, agrees with this idea. In an article for the International Primal Association newsletter he states,

“Survival is a key motivation for systemic operations in a universe that seems often on the brink of chaos.”⁶⁸

A familiar discussion among practitioners around the world involves a common theme found when their patients/clients are presented with the need to heal. At such times the patient/client may experience a major upheaval, which can, at times, appear as chaotic and confused. These events seem to precede healing. I believe this is part of the mind-body dance of a homeodynamic and human process. After a thirty-one year career as a general medicine clinician, Dr. Jerry Pittman wisely observed that, “Statistics breakdown in the individual case.”⁶⁹ Perhaps much of what we are taught on the road to learning our respective crafts are mere guidelines rather than rules of expectant outcomes.

CHAPTER 5: A BRIEF SKETCH OF THE NERVOUS SYSTEM

“The most beautiful emotion we can experience is the mysterious. It is the source of all emotion that stands at the cradle of all true art and science.”
-- Albert Einstein

The nervous system is divided into the peripheral nervous system (PNS) and the central nervous system (CNS). The PNS consists of sensory neurons running from stimulus receptors that inform the CNS of stimuli and motor neurons running from the CNS to the muscles and glands, called effectors that take action, either by excitation or inhibition. The CNS consists of the spinal cord and the brain. The peripheral nervous system is subdivided into the sensory- somatic nervous system and the autonomic nervous system.

The Sensory Somatic Nervous System

The sensory-somatic system consists of twelve pairs of cranial nerves and thirty-one pairs of spinal nerves. All of the spinal nerves are "mixed"; that is they contain both sensory and motor neurons. Our conscious awareness of the external environment and our motor activity to manage (survive and thrive) within it operates through the sensory-somatic division of the PNS. The autonomic nervous system (ANS) consists of sensory neurons and motor neurons that extend between the central nervous system (especially the hypothalamus and medulla oblongata) and various internal organs such as the heart, lungs, viscera and glands (both exocrine and endocrine). The ANS is responsible for monitoring conditions in the internal environment and signaling (in the form of ligands) for what is required and in order to achieve balance.

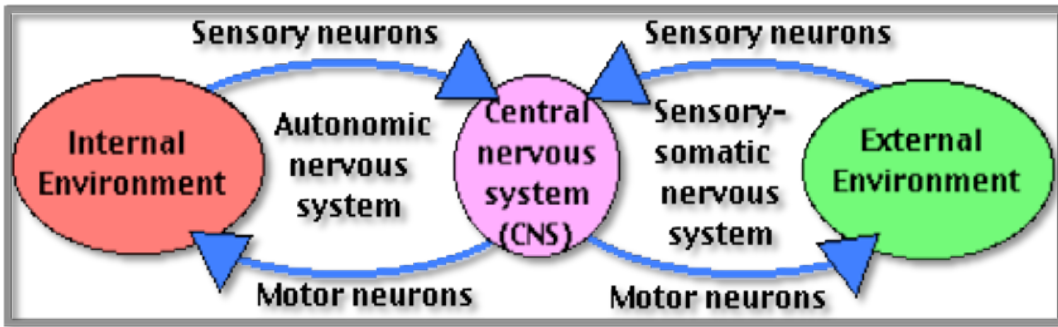


Figure 22.⁷⁰ **Sensory and motor neuronal feedback loop**

The above image depicts the feedback loop from these various nervous systems.

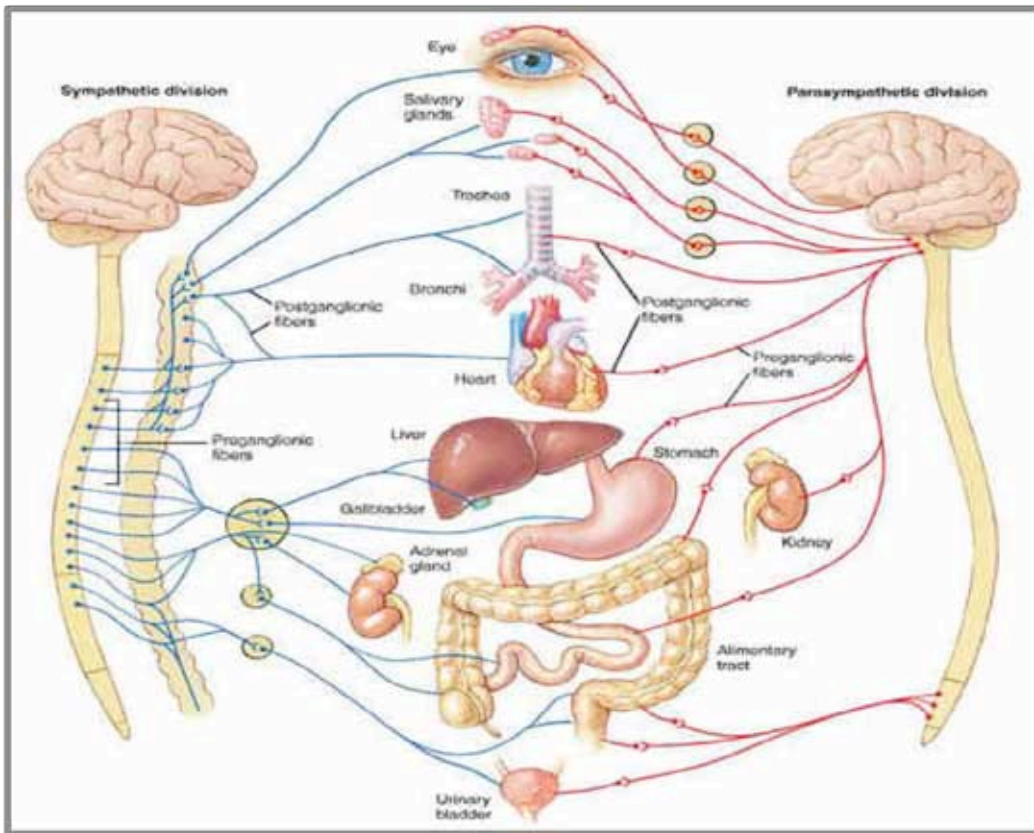


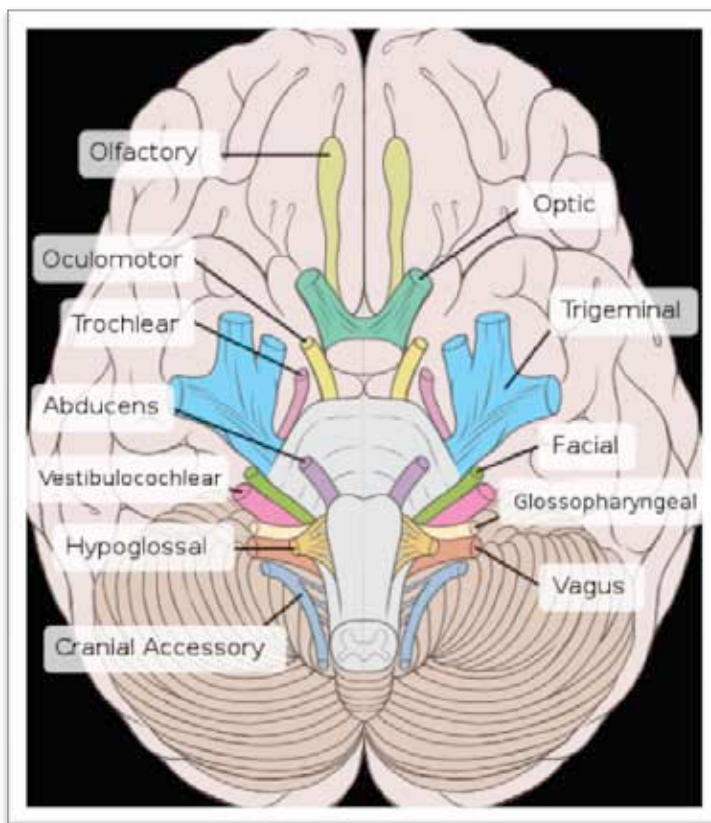
Figure 23.⁷¹ **Image of nervous system communication**

Imaged here are the preganglionic and postganglionic neurons of the parasympathetic nervous system (PSNS), a division of the autonomic nervous system (ANS), along with the sympathetic nervous system (SNS) and the enteric nervous system (ENS). The ANS is a subdivision of the peripheral nervous system (PNS). The ANS sends fibers to at least three tissues: cardiac muscle, smooth muscle, and glandular tissues.

Does The Vagus Nerve Serve as a Communicative Feedback Loop in the Nervous System of Human Terrain?

The vagus nerve originates in the medulla oblongata, a part of the brainstem, and is dorsal to the RAS. "Vagus" (Latin for "wandering") is the tenth cranial nerve (CN X). There are twelve cranial nerves in total with bilateral branches from the brainstem. This remarkable, "wandering" vagus nerve has a more extensive course of distribution than any of the other cranial nerves.

Table 2. Cranial Nerves



CRANIAL NERVES
I - Olfactory
II - Optic
III - Oculomotor
IV - Trochlear
V - Trigeminal
VI - Abducent
VII - Facial
VIII - Acoustic
IX - Glossopharyngeal
X - Vagus
XI - Accessory
XII - Hypoglossal

Figure 24.⁷² **Inferior view of human brain**

This is an illustration of a normal human brain (inferior view) highlighting where the various cranial nerves exit the brainstem.

The vagus nerve is the main nerve of the autonomic nervous system (ANS). The two branches of the ANS are the parasympathetic, which acts like a brake, and the sympathetic, which acts like an accelerator. Efferent impulses start in the central nervous system and pass peripherally in spinal or cranial nerves. Afferent impulses start out peripherally and pass into the central nervous system. There are two general modalities of the peripheral nervous system, the motor (efferent) and the sensory (afferent). The vagus nerve is composed of both motor and sensory fibers, which communicate sensory and motor information bidirectionally between the brain and body. There is emerging experimental evidence that demonstrates immune and inflammatory responses are modulated by communications along the vagus nerve. In normal anatomy, there is one vagus nerve on each side of the body (see Figure 25).

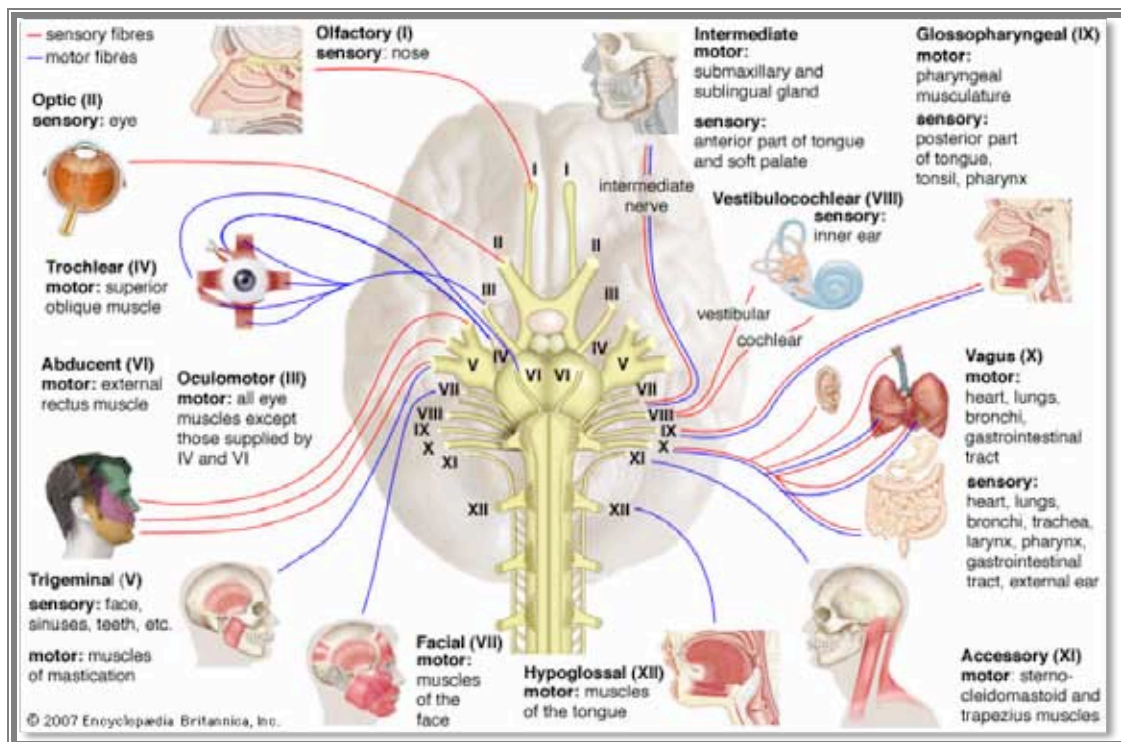


Figure 25.⁷³ **Cranial nerves (I–XII) and their areas of innervation**

This image depicts sensory (afferent) fibers in red and motor (efferent) fibers in blue for all the cranial nerves as seen from a ventral view of the brain.

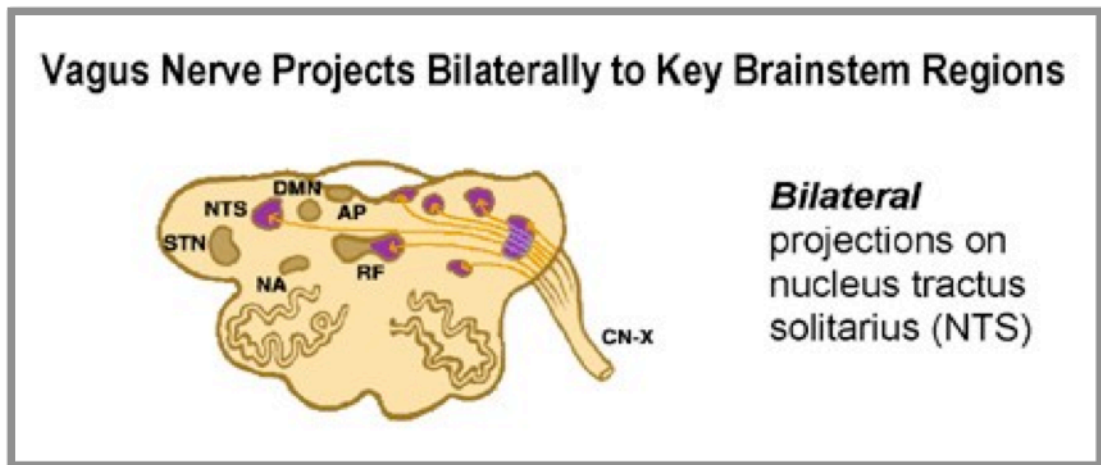


Figure 26.⁷⁴ **Vagus nerve bilateral projection from medulla**

Illustration depicts a horizontal inferior slice of the medulla. STN = Spinal trigeminal nucleus; NTS = Nucleus Tractus Solitarius; DMN = Dorsal motor nucleus of the vagus; AP = Area postrema; NA = Nucleus ambiguus; CN-X = Cranial Nerve X; RF = Reticular Formation

The medulla is located in the brainstem above the spinal cord and ventral to the reticular formation. The medulla is the main site in the brain for regulating sympathetic and parasympathetic outflow to the heart and blood vessels. The nucleus tractus solitarius (NTS) of the medulla receives sensory input from various systemic sensory receptors and mechanoreceptors, such as chemoreceptors, baroreceptors, thermoreceptors and osmoreceptors. A chemoreceptor (also known as chemosensor) is a sensory receptor that transduces a chemical signal into an action potential. Or, more generally, a chemosensor detects certain chemical stimuli in the environment.⁷⁵

- Mechanoreceptors-- hearing and balance, stretching
- Photoreceptors: light
- Chemoreceptors: smell and taste mainly, as well as internal sensors in the digestive and circulatory systems
- Thermoreceptors: changes in temperature
- Electroreceptors: detect electrical currents in the surrounding environment

Autonomic outflow from the medulla is divided chiefly into sympathetic and parasympathetic vagal branches as explained earlier. Some schools of thought believe that the hypothalamus is the locus of control regarding the visceral sensory receptors, while others believe that the RAS or medulla is the locus of control. At this time I stand on the ground that the RAS is not only a neuronal superhighway, but also an active conduit, by which messenger molecules (e.g., neuropeptides, neurotransmitters, hormones, neuromodulators) conduct signals along long and short pathways afferently and efferently. Without its principal and crucial involvement, any other cortical activity in the so-called “higher brain” cannot be registered throughout the body. This is evident in the Rom Houben landmark case, where for twenty-three years he remained in what the doctors are now calling an “unresponsive state” or “locked-in state”.

Houben, who is now fully conscious, communicates via a special touch screen. He reports, “I screamed, but there was nothing to hear.” In 1983 at the age of twenty, Houben was injured in an auto accident. Doctors said he fell into a coma at first, and then went into a vegetative state. A comatose state is defined as an unconscious condition in which the eyes are closed and the patient cannot be aroused. A vegetative state is described as a state in which the eyes are open and can move, and the patient has periods of sleep and periods of wakefulness, but remains unresponsive. During Houben’s two lost decades his eyesight declined, but the experts say he could hear doctors, nurses and visitors and he knew the touch of a relative. At some point, Houben recalls learning his father had died, but he was unable to show any emotion despite feeling intense sadness. Twenty-first century technology allowed doctors to conduct new tests on Rom Houben. A PET scan revealed activity in most regions of his brain, which allowed for a

new diagnosis: “locked-in syndrome,” a condition in which people can think and reason, yet are unable to speak, move or emote. “We saw his brain was almost normal,” said neuropsychologist Audrey Vanhauzenhuyse, who has worked with Houben for three years. “You have to imagine yourself lying in bed wanting to speak and move but unable to do so — while in your head you are OK. ‘It was extremely difficult for him and he showed a lot of anger, which is normal since he was very frustrated.’”⁷⁶ Houben’s case has allowed us to cross a threshold; doctors can now use additional testing, and ask deeper questions of human consciousness. Dr. Steven Laureys, of Belgium’s Coma Science Group, has discovered some degree of consciousness in other patients using state-of-the-art equipment. He looks at about fifty cases from around the world a year, but none have been as extreme as that of Rom Houben. We know that there is a fine line between a vegetative state and minimal consciousness. Laureys offers, “It is very difficult to tell the difference.”⁷⁷ Laureys’ studies reveal that forty percent of patients with consciousness disorders are wrongly diagnosed. Houben’s ability to be aware of his environment and of conversations around him, and his lack of the ability to respond and engage his body demonstrate my proposal that consciousness is ubiquitous. His RAS appears to be functional, but Houben’s loss of motor function and ability to communicate indicates that some damage has taken place in the brainstem.

While state-of-the-art diagnostic tools may be useful in assessing some cases, there are limitations remaining beyond the limits of our current technological abilities. Radiologists tell us that the brainstem is very difficult to image. Might we be relying too heavily on our ability to “see” the neural activity in the thalamus, hypothalamus, hippocampus and amygdala? Perhaps we are assuming that because we see the activity

in particular regions that we understand where particular messages originate? The answers to these questions will probably not be available for a number of years. However, I feel it is important not to make assumptions based solely on what is seen using our present scanning devices.

Nature, by design, is usually very efficient. Therefore I believe it is reasonable to investigate why we have evolved with a single nerve whose branches run throughout the body, beginning in the brainstem and innervating the entirety of the viscera. The feedback loop of the vagus nerve, in its simplest explanation, takes place via a combination of electrical and chemical processes. This is so much the case that scientists and device manufacturers have created devices, Vagus Nerve Stimulators (VNS) which, when implanted into the body, can generate signal transfers within the brain that can prevent epileptic seizures or treat chronic depression. Such VNS devices act by producing short bursts of electrical energy that are directed into the brain via the vagus nerve. [Note: VNS is used both as an acronym for vagus nerve stimulators and vagus nerve stimulation in the literature].

Vagus nerve stimulation (VNS) is a type of treatment in which short bursts of electrical energy are directed into the brain via the vagus nerve.

The vagus nerve is a major connection between the brain and the rest of the body. It carries sensory information from the body to the brain, and motor commands from the brain to the body. The vagus is involved in complex control loops between these destinations; its precise pathways and mechanisms are still not fully understood. It is also not known how stimulation of the vagus nerve works to reduce seizure activity—it may stimulate inhibitory pathways that prevent the brain's electrical activity from getting out of control, interrupt some feedback loops that worsen seizures, or act in some other fashion.

Vagal nerve stimulation has been effective in reducing seizure frequency in patients whose seizures are not controlled by drugs, and who are either not candidates for other types of brain surgery or who have chosen not to undergo these procedures.⁷⁸

In his book, *Visceral Sensory Neuroscience: Interoception* Oliver Cameron concludes his chapter on “The Neural Basis of Visceral Perception” by stating, “The overall organization of autonomic pathways into the brain includes reflexes and central integration. ... For example, the afferents of the baroreceptor reflex seem to go as far as the nucleus of the solitary tract (nucleus tractus solitarius – NTS), then connect to brainstem descending efferents via interneurons. The second set of pathways leads higher in the neuraxis [sic], producing functional integration by affecting hypothalamic, limbic, thalamic, and cortical centers that influence hormonal output and emotional-motivational, behavioral, and cognitive functions.”⁷⁹ These are the principles that underscore the importance of the autonomic pathways to interoception. The illustration in figure 27 shows the nucleus ambiguus (NA) and dorsal motor nucleus (DMN) motor pathways as well as NTS sensory pathway connections all involving the vagus nerve.

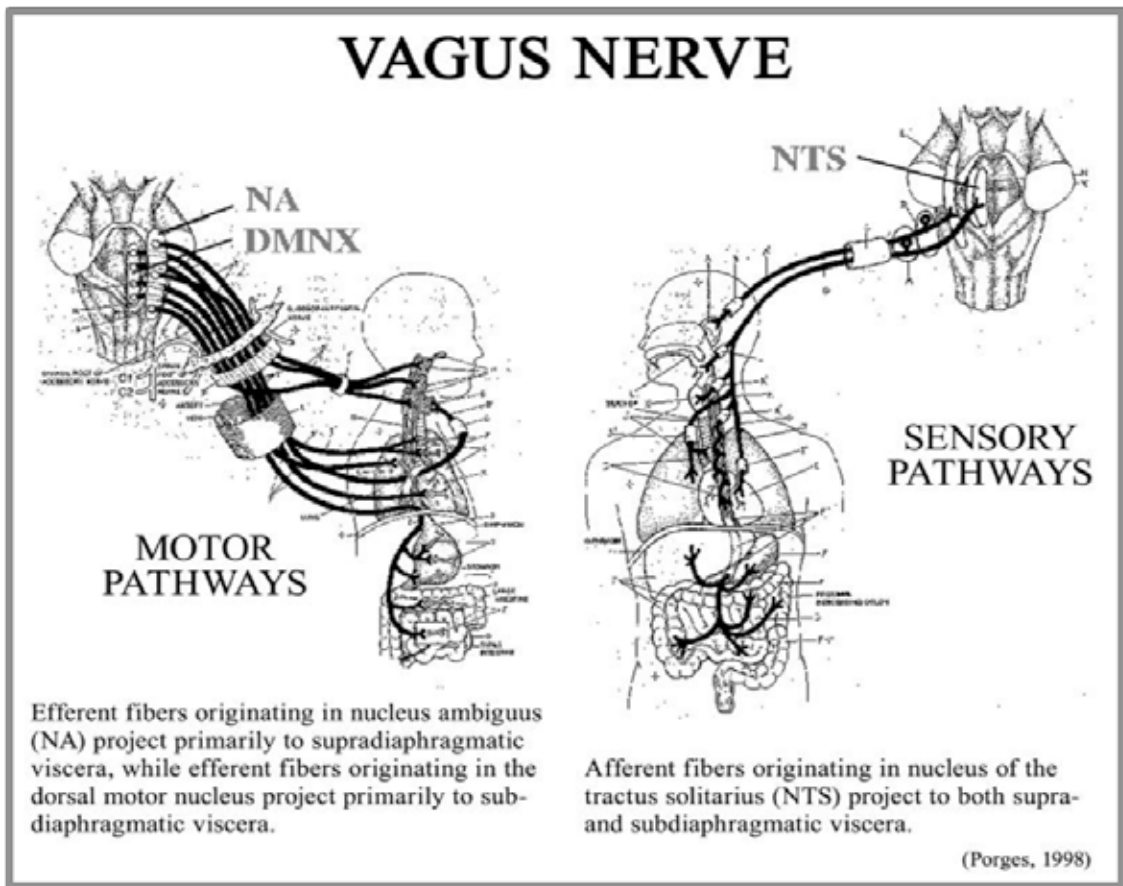


Figure 27.⁸⁰ **Vagus nerve motor and sensory pathways**

Depicted here are the motor (efferent fibers) and sensory (afferent fibers) pathways.

If it is true that the brainstem's excitatory and inhibitory signaling pathways are even partially regulating the afferent and efferent expression of most if not all the body's messenger molecules (e.g., neuropeptides, neurotransmitters, hormones, neuromodulators), then it might make sense to find a way to measure what is taking place in this hub of activity.

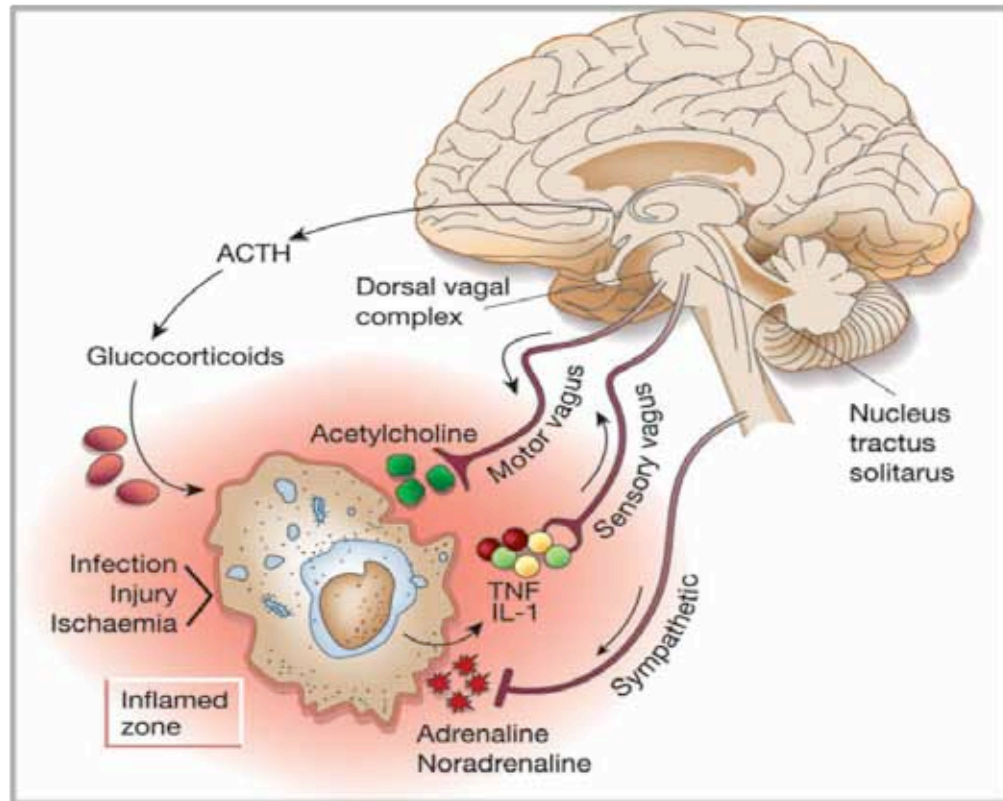


Figure 28.⁸¹ **Brainstem and vagus nerve feedback loops in the inflammation response**

This image illustrates how the RAS uses multiple systems to instruct and monitor an inflammatory response in the body. Corticosteroids are released from the adrenal glands in response to the release of AdrenoCorticoTropic Hormone (ACTH) from the pituitary gland. Efferent sympathetic signals, carried along spinal nerves, trigger the release of noradrenaline and adrenaline, the body's primary stress hormones. Breakdown products of damaged tissue at the site of the inflammation, including TNF (Tumor Necrosis Factor) and IL-1 (Interleukin 1) function as chemical triggers or afferent signals up the vagus nerve. Signals via the vagus nerve monitor (afferent fibers) and modulate (efferent fibers) in an inflammatory response to infection, injury or ischemia.⁸²

Not acknowledged in this diagram are the multiple system cascades of responses that are part and parcel of the communicative feedback loops, but are most certainly employed in any given situation where the body responds to an internal and/or external event.

Cell signaling and visceral regulation are of paramount importance to functional systems. As earlier established, one of the main conduits of communication is the vagus

nerve or tenth (CN-X) cranial nerve. Figure 28 below, offers a depiction of the visceral innervation by the vagus nerve and its intersection with all the various nerve plexuses.

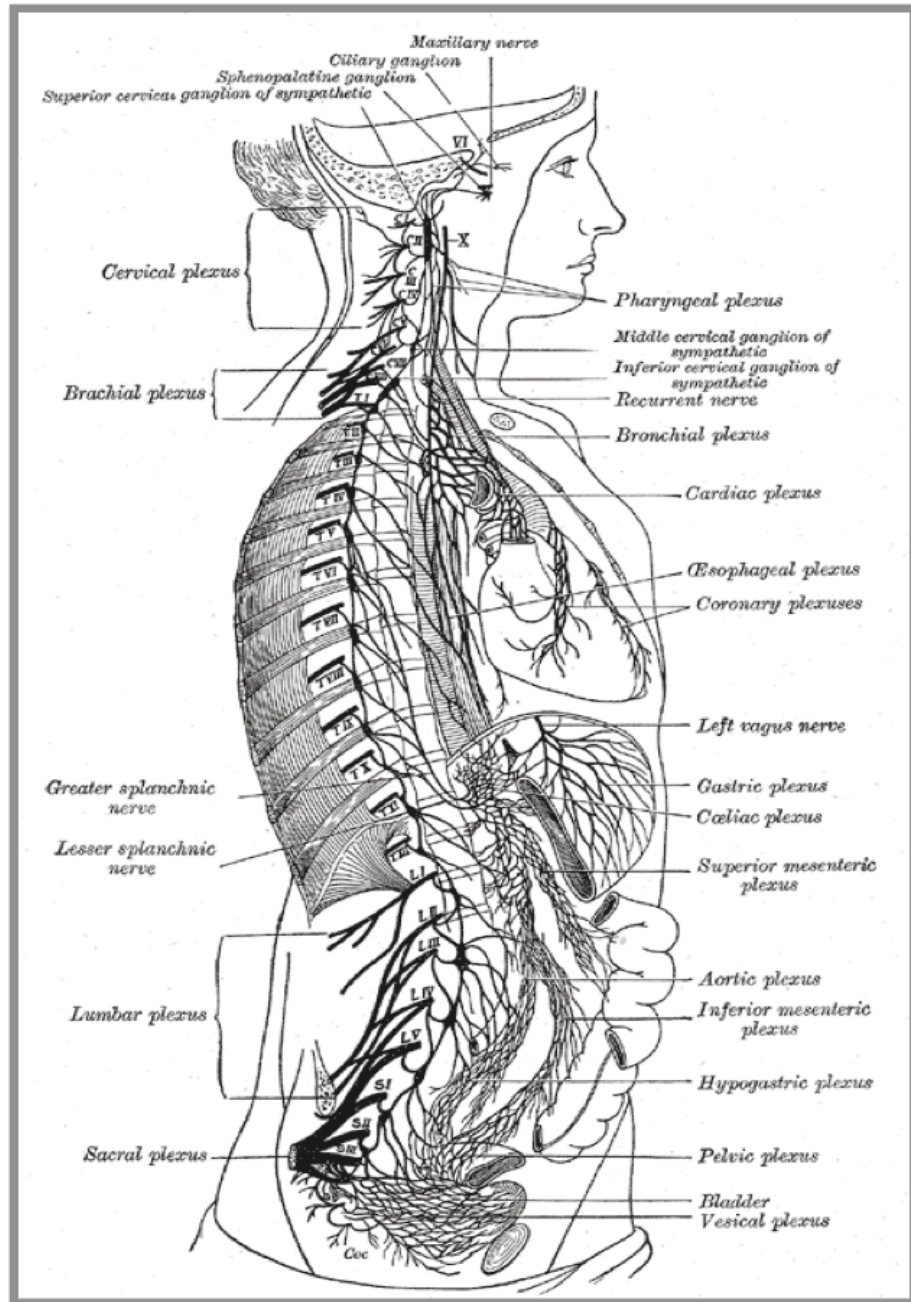


Figure 29.⁸³ **Right side sagittal view of the sympathetic chain**

This image shows the right sympathetic chain and its connections with the thoracic, abdominal, and pelvic plexuses.

Cell Signaling: Blending Energy with Information Processing

“Millions of items ... are present to my senses which never properly enter into my experience. Why? Because they have no interest for me. My experience is what I agree to attend to.... Each of us literally chooses, by his ways of attending to things, what sort of a universe he shall appear to himself to inhabit.”
-- William James

We are at a tipping point here. We have both the old paradigm of mechanics and the new paradigm, which is focused on energies, gross and subtle. It is not necessary to make an either/or choice; practitioners and researchers in energy or vibrational medicine do not need to throw away the proven model of mechanistic thinking -- instead add their perspective, their insights and their data. The two ideas can coexist.

How is it that we have become aware of the mind-body involvement? – The answer may lie in our biochemistry. Groups of cells of like kind are called tissues, from outer skin to each visceral organ. A cellular community creates these tissues, joined together in structured systems, with each system having a common function, (e.g., brain, respiratory, digestive, nervous, excretory, endocrine). Each eukaryote (a nucleus containing cell) is a mirror of the great whole -- containing miniaturized organs, called *organelles*. Bruce Lipton says, “The organelles are the functional equivalents of the tissues and organs of our own bodies.”⁸⁴ Each organelle as a subunit of the cell has its own function, depending on the cell type.

Nearly every cell in the body has thousands of tiny formations faceted on its outer membrane, called *receptors*. Receptors are like our senses, eyes, ears, nose, and their job, is to detect signals coming to them via chemical messenger ligands. Recent investigations (in the last ten years) have suggested that biophotons may be responsible for this cell-to-cell information exchange.

"The high degree of coherence of biophotons elucidates the universal phenomenon of biological systems — coherence of biophotons is responsible for the information transfer within and between cells. This answers the crucial question of intra and extracellular biocommunication, including the regulation of metabolic activities of cells, growth, differentiation and evolutionary development." — F.A. Popp, 1999⁸⁵

One of the beliefs within the new paradigm in biology and physiology is that cellular signaling and communication is providing for an infrastructure of biological and subtle energy systems. This subject is covered in greater detail in upcoming sections.

From one perspective, we might be considered a *closed system* inside the skin and fascia, but we are also an *open system* as we relate to our environment. We each have our own fluids, marrow, organs, tissues and cells, and each cell itself functions in a self-organized community-member manner. We are also an *open system* in that we are part of a larger community, filled with other humans, plants, animals, sea-life, bacteria, viruses and pathogens. Though we interact with this community, we are not the community itself.

Just as cells use their receptors to sense the environment in which they exist, the outer body receives information using the five senses. Our sensory responses are evidence of human contact with the world at large, as well as our inner-world of mind and body. Whether we experience life as dangerous, or divine is a personal choice. In essence, we may be mystical beings. There are many facets to our physiology, and how we heal sometimes defies the rationale of our limited, conscious minds. I believe that we are much more than our skin, bones and cells. In the next section, we will be looking more deeply into the mystical and invisible realms, still bearing in mind the micro relationship to the macro cosmological environment, our place within the cosmos.

CHAPTER 6: SPIRIT AND MATTER: CREATING UNION WITH THE DIVINE

“Let sustained effort be the seed of synthesis, the force which binds together that which has been separated.” --- Alice A. Bailey

Alice Ann Bailey (A.A.B.) was born in Manchester, England in 1880. At the age of 15, while sitting at home, she was visited by a wisdom master who told her that she could do some useful work, but that doing this work would require her to change her disposition quite significantly. Growing up, she had been rather surly, and was staunchly independent. She moved to America in 1907, and there spent the rest of her life. It was not until 1915 that she learned that her visitor was the Master Koot Hoomi (Master K.H.), a Master known to the Theosophists to be very close to the Christ. Master K.H. is a teacher who is an outstanding exponent of the love-wisdom, of which the Christ is the full expression. From then on, the relationship between Bailey and Master K.H. grew closer and closer, until she could contact him at will while in a meditative or conscious-channeled state. In 1919, the Tibetan Master Djwhal Khul (Master D.K.), a member of the Spiritual Hierarchy, asked if she was willing to write some books for the public. After some initial reluctance, she consulted her known Master K.H., who assured her that he, indeed, had suggested that she might help the Tibetan. Through the collaboration between Bailey and Master D.K., she had the opportunity of conducting valuable work. She immediately started her prolific effort as an amanuensis for the Tibetan, who dictated the books to her telepathically. In this manner, a series of twenty books were produced from 1919 to 1949. Bailey additionally has written four books herself, as well an unfinished autobiography. Widely recognized as a writer and lecturer, she died in

December 1949, just thirty days after the completion of her (previously agreed to) thirty years of shouldering the work of transcribing the esoteric teachings.^{86/87}

Long before Bailey's life and work, Helena Petrovna Blavatsky (1831-1891), had a similar relationship to wisdom masters, who spoke through her in comparable manner -- although Blavatsky was considered to be in a trance state as she wrote. During the nineteenth century, Blavatsky prophesized that a disciple would come in the twentieth century to give the psychological key to her book, *The Secret Doctrine*. That book (The Secret Doctrine) had been given to Blavatsky by The Tibetan in the same manner of dictation he employed while working with Bailey. *A Treatise on Cosmic Fire*, the first book given to Bailey by The Tibetan, fulfilled Blavatsky's prophecy.

In *A Treatise on Cosmic Fire*, Alice Bailey teaches that "The etheric body is really a net-work of fine channels, which are the component parts of one interlacing fine cord, -- one portion of this cord being the magnetic link [sutrātma] which unites the physical and the astral bodies and which is snapped or broken after the withdrawal of the etheric body from the dense physical body at the time of death."⁸⁸ I believe this network of "fine channels" may be likened to our fascial body, as in the tensegrity model of our human structure. Today, we have an elegant demonstration of this network in fascia and tensegrity through the work of Thomas Myers and others.

Thomas Myers has done extensive fresh cadaver research and dissection work. He is a globally recognized speaker, and instructs others in his techniques. The images of the fascia in figures 30 through 32, demonstrate the connective web-like, endogenous connective tissue fabric. I quote from Myers' elaborate and image-centric website:

“Fascia is the fascinating biological fabric and glue that holds us together. Long ignored, the fascial system is now getting its rightful due of attention, from both therapists and researchers. ...

[These images (Figures 30-32) are of fresh cadaver fascia from the lab of Thomas Myers]



Figure 30.⁸⁹ **Fascial tensegrity**



Figure 31.⁹⁰ **Fascial tension**

...Tensegrity is a model for understanding the geometry of the body, on both a micro- and a macro-cosmic scale that leads to many new insights in terms of body connectivity, the relation between stability and movement, and how we can develop what might be called ‘Spatial Medicine’.”⁹¹

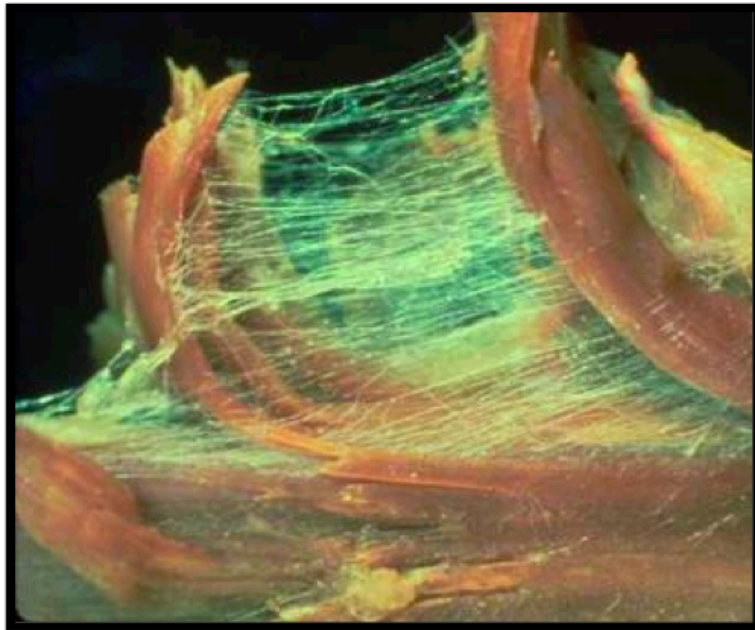


Figure 32.⁹² **Web-like fascia fibers**

“We are using fascia here in its larger sense – our interest is in the connective tissue network, or collagenous net, or extra-cellular matrix. This is a picture particularly of the endomysial myofascia, but all the collagen in the body is linked up in one net.”⁹³

This quotation by Myers: “...This is a picture particularly of the endomysial myofascia, but all the collagen in the body is linked up in one net,” is including almost the whole body in a collagenous category.

If we are to adopt this, heretofore, heterodoxical notion, it may require new theories to combine and integrate the biomedical model (traditional and known physiological attributes) with subtle energy and quantum physics (biophotons, torsion, resonance) models. More details in regard to this are to be found in the following section. Myers admits that while this view of collagen combines various models found in several branches of medicine, he does not readily deal with the various models in his texts. There are differing opinions as to the number of collagen types, (up to twenty-nine types), with each type having its own properties and functions.

According to multiple sources, including the Wikipedia encyclopedia, collagen types are described in this way:

“Collagen occurs in many places throughout the body. So far, 29 types of collagen have been identified and described. Over 90% of the collagen in the body, however, is of type I, II, III, and IV.

- Collagen One: skin, tendon, vascular, ligature, organs, bone (main component of bone)
- Collagen Two: cartilage (main component of cartilage)
- Collagen Three: reticulate (main component of reticular fibers), commonly found alongside type I
- Collagen Four: forms bases of cell basement membrane
- Collagen Five: cells surfaces, hair and placenta”⁹⁴

Therefore, it may be more accurate to say the body is linked up through various forms of web-like connective matrices and tissues, within which varying properties of form and function are still being discovered. In Myers recent classes (2010), he and his instructors also refer to collagen as myofascial meridians.

I believe that the connective tissues, with their various properties, are a physiological (or biological) communication web, transducing and transmitting energetic signals throughout the body.

Stedman’s Medical Dictionary defines “collagen” as “The major protein (comprising over half of that in mammals) of the white fibers of connective tissue, cartilage, and bone... It comprises a family of genetically distinct molecules all of which have a unique triple helix configuration.”⁹⁵ Collagen, in the form of elongated fibrils, makes up the fibrous tissues found within tendons, ligaments and skin. It is also abundant in cornea, cartilage, bone, blood vessels, the gut and intervertebral discs. Traditionally trained physicians in this country and in Europe may find the concept of a contiguous and continuous connective tissue system (including the fascial components of

bones to organs) difficult or problematic to comprehend, especially when considering the many types and properties of collagen, fascia and extracellular matrices. At present, no two sources agree on the number collagen types, each having their own unique polypeptide chains.^{96/97/98/99/100}

Until there is a bridge in place that includes the paradigms of the ancient, the quasi-modern (last two hundred years) and the now emerging energy sciences, the chasm will remain. We will need balance, open minds and pause for consideration of both/and, rather than either/or – if this chasm is to be bridged.

It is significant to note the similarity of the words chosen by Alice Bailey and Master D.K. and the Myers' descriptions of an 'etheric net-work of fine channels', visible at the physical level, which have recently been demonstrated by Korean and Chinese researchers (More information about the Bonghan Ducts follows). In most traditional medical schools, students are taught to ignore the fascia, and to discard it in their tissue boxes. If we could measure the transduction or transmission of information/energy within the fascia (i.e., the transfer of fluid, signals, light, energetic impulses) at various levels in the body, might we find what many cultures call life force? [I am using the term transduction to indicate information/energy transmission as mentioned above.

Transduction as a term is used in many other fields to indicate a change from one energetic information state to another, for example, the transduction of an electrical signal from a microphone into sound emanating from a speaker; or sound transduced into an electrical signal by our auditory apparatus and the auditory nerve.]

If we could see life force energy, would humanity be more apt to believe in it?

Life force is a concept common to most healing traditions other than Western allopathic medicine, and it is regarded similarly cross culturally.

Dr. Claude Swanson in his latest book, *Life Force, The Scientific Basis*, introduces “life force” thus:

The “Life Force” is central to many forms of energy healing, such as Reiki and Qigong. It is the energy, which flows in the acupuncture system of the body, and is basic to alternative medicine. In Traditional Chinese medicine it is called “*chi*” (or “*Qi*,” both pronounced “*chee*”). In Hindu Ayurvedic medicine it is called, “*prana*.” In other cultures it has been called od, orgone, bioplasma, bioenergy, biogravity and many other names. In the West today it is often called “*subtle energy*.” It is believed to respond to and interact with consciousness [Consciousness]. In fact, it may be the essence of consciousness [and Consciousness] itself.¹⁰¹

Master D.K. (through Alice Bailey) explains the function of the etheric body as so closely related to the physical body that they are not discussed separately. “Primarily the functions of the etheric body are three in number: 1. It is the receiver of prana, 2. It is the assimilator of prana and 3. It is the transmitter of prana. *Prana* is used here to describe an individual experience, life energy and life experience in one container, grossly called the body. Prana is within the body so long as the body is alive. Prana, or vitality, is the mind and senses in common function.”¹⁰²

Esoteric Teachings, Etheric Fields and Activation of The Alta Major Center/Chakra

*“The triangle is the esoteric symbol of the Buddha”
--- H. Saraydarian*

Thus far we have been focused on parts of the anatomy and physiology, which can easily be seen or measured within our existing data sets and utilizing our twenty-first century tools. This next part of my thesis requires an adjustment of our altimeters. We must climb to more rarefied, less dense, and less detectable levels now, as we will be shifting our perspective. At times we will be traveling at ground level, but for the most part we are climbing to a hundred thousand feet or more. This section also requires that the reader have some primary knowledge of subtle energy in the realm of biophysics, and a basic understanding of electromagnetism. We will now be speaking in the language of etheric energy.

In the 2008 Spring edition of the journal *Explore*, a featured article was published, entitled, “Esoteric Healing Traditions: A Conceptual Overview,” written by Jeff Levin, a social epidemiologist. In this paper, Levin articulates the influence and characteristics of subtle energies in our visible and tangible world. He states, “Throughout esoteric systems, a predominant theme is the presence of a ‘subtle’ aspect to physical reality that invisibly interpenetrates the more visible and sensate three-dimensional universe. Concomitant to manifestations of this subtle realm in the natural environment (e.g., the existence of multiple higher dimensions, the ever presence of discarnate beings, the activity of ‘elemental’ spirits, the reincarnation of souls) are certain features of human anatomy not currently endorsed by allopathic biomedicine.”¹⁰³

In an effort to harness and use consistent definitions of esoteric terms, and in an attempt to avoid the introduction of more neologisms, I extend Levin's quotation: "These [features] include (a.) the presence of several subtle human bodies or sheaths, surrounding and interpenetrating the visible, physical body; (b.) the location on, in, or along these vehicles of powerful vortices or energy centers (e.g., the yogic chakras); (c.) the existence of a subtle healing energy or vital force; and (d.) the operation of a functional system of channels that allows the flow of vital life force throughout these energy centers and vehicles. Whether fact or fiction, these four features have become elements of a *lingua franca*, facilitating communication among a wide variety of modern-day esotericists, regardless of tradition."¹⁰⁴

According to the Theosophists, these subtle body layers correspond to the etheric-dimensions or planes, each having a specific meaning regarding its content. The content (types of information) contained in these fields, is what esoteric healers are working with as they conduct local and distant healings. What exactly is in these fields of energy is the focus of a very active discussion amongst scientists and practitioners. In these conversations one finds a number of topics, which increase daily; but consistently involve biophotons, torsion waves, meridians/channels and electromagnetism. In regard to learning more about content, German based scientist, Fritz A. Popp has proposed that DeoxyriboNucleic Acid (DNA) transmits and receives biophotons (packets of light). The biophotons pass through the body, enabling the DNA to inform and replicate the physical processes within the body. Biophotons appear to be a type of coherent (laser-like) light, and appear to carry blueprint patterns from which cells, organs and tissues can grow. A

team of Eastern European scientists discovered that acupuncture meridians might be waveguides for the body's electromagnetic energy (Sit'ko, et al, 1988, 1991,1994).

To my mind, this model does not replace the conventional replication models of DNA and RNA, but rather augments it. The DNA replication model proposed by James Watson and Francis Crick, explains that of the two strands of the double helix, one of the old strands is always kept in the newly created double helix. After the double helical structure of DNA was proposed, confirmed and reconfirmed, it was discovered that the two strands of DNA contain genetic codes for its self-replication. The nucleotide sequence of DNA is copied into RNA (RiboNucleicAcid is very similar to DNA, but differs in function from DNA. RNA is involved in processing the information from the DNA to make proteins), which uses the coded information to specify the sequence of amino acids – a particular protein.^{105/106} In the process of replicating itself prior to cell division, a cell duplicates the information contained in its double stranded DNA complement to produce a copy of its double stranded DNA molecule. While the DNA remains in the nucleus, it uses a chemical called *messenger RNA* (mRNA) to carry the instructive message to the ribosomes where proteins are created. The biophotonic model (explained simplistically above) does not replace this conventional genetic replication model, but may serve to explain how the instructions for the replication process are being transferred and received. Further research is required in this area.

How might DNA transmit and receive biophotons? A North Korean researcher, Kim Bonghan in the 1960s, described an unusual threadlike network whose structures have been found on the surfaces of organs, such as the stomach, liver, large and small intestines and bladder, in rats and rabbits. Named after the person who found them, these

threadlike structures are called *Bonghan Ducts*. Bonghan's findings were largely ignored for the past forty years, due to the fact that his work could not be replicated. The staining technique that he developed was never revealed. The Bonghan ducts within the past two years (2008-2010) have been renamed the Primo-vascular System by researchers in the field. In modern biophysics labs studying and imaging acupuncture meridians, scientists used stereomicroscopy and electron microscopy to demonstrate the ducts' structure. More studies are necessary, but multiple studies have identified the Bonghan ducts as liquid crystalline transportation channels for DNA and RNA (Shin, 2005; Lee, 2004a, 2004b; Soh, 2004, 2005,). "... by tracing the ducts with a staining dye, he [Bonghan] discovered that the ducts continued to spread onto the surfaces of internal organs and that they existed even inside blood vessels. He also found that a liquid flowed through the Bonghan duct system, and that the liquid played a physiological role akin to modern cell therapy by totipotent [ed: cells that have the capacity to form an entire organism] adult stem cells. The flow of this liquid was correlated with the therapeutic effects resulting from acupuncture treatments of damaged internal organs."¹⁰⁷ Bonghan called this liquid crystalline substance *Sanal* (Kim, 1965). Kwang-Sup Soh, one of the leading researchers of Bonghan ducts, has proposed a waveguide model whereby biophotons propagate and carry information along these ducts. Soh received his Ph.D. from Brown University in Providence Rhode Island, and today is a professor at the Biomedical Physics Laboratory, Seoul National University, South Korea.

Claude Swanson is a noted physicist who has done work at Princeton and MIT. In his book, *Life Force, The Scientific Basis*, he offers extensive details about torsion fields, a term that Russian researchers have been using to describe subtle energy and

energy bodies. Dr. Swanson, one of the few Western scientists who have written about the work of the Russian researchers, postulates that the study of torsion fields may yield answers to questions such as: *what is the aura*; and *how does healing at distance work*. He explains that torsion waves are present even when electromagnetic energy is absent. Swanson reminds us that, “Popp’s work tells us that every time DNA makes a biophoton, it also makes a torsion wave. Electromagnetic energy is mostly contained inside the body whereas torsion fields are outside the body -- and is what makes up the aura.”¹⁰⁸

So what is the aura? According to Swanson, the aura “... is a coherent holographic field of torsion waves.”¹⁰⁹ This is, at least, one potentially viable answer. Douglas Baker, a medical graduate of Sheffield University, supposes that understanding the aura should not be difficult if we understand how different states of matter interpenetrate one another.¹¹⁰ Baker has dedicated his life to the scientific study of the fields of metaphysics and esoteric healing since the early 1960s. Such study is fruitful, yet immature in the sense that much rigorous testing and replication needs to take place before we are able to move beyond simply believing in the invisible realms.

As inventive technology, and the creativity to use it advances, patience and open-mindedness are necessary ingredients for creating and crossing a physical/etheric bridge. The various investigations mentioned above are based on solid scientific research principles, yet appear to be only be supported by other scientists who have actually examined the studies. By this I mean that progress cannot be made in these areas, until a sufficient number of other scientists have examined the work of the pioneers in energy medicine, and replicated their work. It is easier to criticize than it is to examine and replicate, though efforts made towards study and replication are a necessary pillar of the

needed bridge. In the meantime, it is possible to recognize that solid, legitimate and hard scientific research has been conducted in the study of subtle energy. I suspect that, sometime in the future, there will be a further reflection of how incomplete the models in use today are, in both mainstream medical science and in energy medicine and energy physics. If we recognize that the study of subtle energy may produce evidence of Spirit, we must remember that such evidence will, by its very nature, wreak havoc with some conventional dogmas. A case in point is the human genome project. The project has made us aware of the steep trajectory of our learning curve with regard to human origins and the building blocks of the form side of life. Though I believe the “failed” genome effort has allowed an opportunity for Spirit to enter back into scientific discussion. I am not speaking of religion, but of Spirit. Spirit from the Latin root of *Spiritus*, meaning the breath of life (vitality). Spirit is the principle of conscious life and the vital principle in humans, animating a body or mediating between body and soul -- the nonmaterial, intelligent and sentient part of a person.^{111/112}

I assert that we need to recognize that Spirit, science and art are inextricably woven together in the tapestry of life; we need to acknowledge this as a fact if we are to gain a deeper understanding of the human being in form and function. We are not simply mechanical threads; we are threads of the fabric of the Cosmos, woven by our consciousness and our Consciousness.

The Kybalion, an ancient Hermetic text states, “The Lips of Wisdom are closed, except to the ears of Understanding.”¹¹³ Esoteric healers know how to move within these subtle energy fields, access information and assist with bringing awareness to the person with whom they are working. The word *esoteric* is defined as “requiring or exhibiting

knowledge that is restricted to a small group; and is designed for or understood by the specially initiated alone.”¹¹⁴ By comparison *exoteric*, is defined as: “suitable to be imparted to the public; belonging to the outer or less initiate.”¹¹⁵ The esoteric texts teach us that, the “specially initiated” are the ones willing to deepen self-awareness (Consciousness), and venture into unknown territory in a spiritually meaningful way.

As will be evident in the coming sections, walking the initiate’s path takes discipline --the journey is not for everyone. The next section is only a brief excursion into the esoteric teachings, even if singularly focused on the Alice Bailey material. What is presented here is meant to inform, considering the importance of the alta major chakra, with regard to its inclusion in our proposed RAS-Vagus-Alta Major Chakra Axis.

CHAPTER 7: COMPLETING THE AXIS: WHY THE ALTA MAJOR CENTER/CHAKRA?

There are twenty-four books in the Alice Bailey collection of esoteric teachings, and a majority of them have references to the alta major center and its operative power. Esoterically speaking, the alta major center or chakra is believed to be in the etheric body. It is the final chakra or energy center of the human form to be activated. When the alta major center is activated, human consciousness expands to merge with Consciousness. While there are numerous fine details we could discuss, there are three major points I would draw to your attention with regard to the alta major center:

1. How it becomes activated
2. Its placement and interactions within the etheric/physical energy field; its alignment with the outcropping of the vagus nerve and the reticular activating system (RAS) -- the Axis proposal, and
3. The alta major center's etheric bridge-like position, making it useful in the processes of expanding awareness and in Spiritual development; a bridge connecting the physical and non-physical, and through which, body, mind and spirit are demonstrably not separate, but fused in union, engaging in purposeful two-way communication between the physical human life and the human Spirit.

Establishing Connection: As Above, so Below; As Below so Above

The Kybalion lists the seven Principals and the Laws of the Universe. The Principle of Correspondence reads:

“As above, so below; as below, so above.” This Principle embodies the truth that there is always a Correspondence between the laws and phenomena of the various planes of Being and Life. ...the grasping at this Principle gives one the means of solving many a dark paradox, and hidden secret of Nature. There are planes beyond our knowing, but when we apply the Principle of Correspondence to them we are able to understand much that would otherwise be unknowable to us. This Principle is of universal application and manifestation, on the various planes of

the material, mental and spiritual universe – it is a Universal Law. The ancient Hermetists considered this Principle as one of the most important mental instruments by which man was able to pry aside the obstacles which hid from view of the Unknown. ...Just as knowledge of the Principles in Geometry enables man to measure distant suns and their movements, while seated in his observatory, so a knowledge of the Principle of Correspondence enables Man to reason intelligently from the Known to the Unknown. Studying the Monad, he understands the archangel.¹¹⁶

An indication of this principle in action may be seen within the various fields of the earth's atmosphere (e.g., magnetosphere, troposphere, mesosphere, stratosphere, ionosphere, exosphere), representing as the 'above' aspect; and the human, flora and fauna kingdoms as the 'below' aspect. Cosmologically speaking, every living thing has detectable pranic life-force energy. An example of this above/below relationship can be found in the discovery that migratory bird behavior demonstrates a direct energetic link between the nervous system of each bird and the earth's magnetic fields.

In the Journal of the National Academy of Sciences (May 2010), this recent study found that magnetic field changes activate neurons in and near the trigeminal brainstem complex of birds, and that the trigeminal nerve (CN-V) V1 (the ophthalmic branch) is necessary for this activation. The researchers suggest that V1 conducts information about the surrounding electromagnetic field to the brain in the studied migratory bird.¹¹⁷ This finding informs and supports our understanding of the vital relationship between the internal and external milieu. It is important here, because an increasing number of scientists are looking for, and finding, proof of a two-way relationship between the earth's electromagnetic fields and organisms living within those fields.

Knowledge and appreciation of both planetary and human energy fields are essential to the work of an esoteric healer. The esoteric healer works with several configurations of triangles, within the human energy field. Discussions of these triangular relationships are found throughout the Alice Bailey texts. Knowledge of the energetic relationships that these triangles represent is used to balance the body's internal environment with the external environment. An esoteric healer understands that these shapes correspond to and with the earth's magnetic energies, and that visualization and vitalization are required, and can be accomplished, through the application of electromagnetic principles. According to *The Kybalion*, the universe is based upon attractive force between opposites in polarity; everything in creation is also subject to magnetism, the Law of Attraction. The Law of Cause and Effect is active within the Law of Attraction; each element is a cause of the other. Thoughts are part of these principles and drive the vitalization and visualization required in esoteric healing.

In *Esoteric Healing*, Master D.K. writes, "Healers would do well to remember that when the three centres [sic] in the head are linked up and the magnetic field is therefore set up and the radiance is present, the healer can then use the ajna centre [sic] as the directing agent for this 'dispelling radiance.' ... You have, therefore, in the head three triangles, of which two are distributors of energy and the third is a distributor of force. ... The attention is placed; the magnetic field is spiritually vitalized; the generated vital radiance is then distributed and directed correctly through the medium of the third triangle."¹¹⁸ See Figure 33.

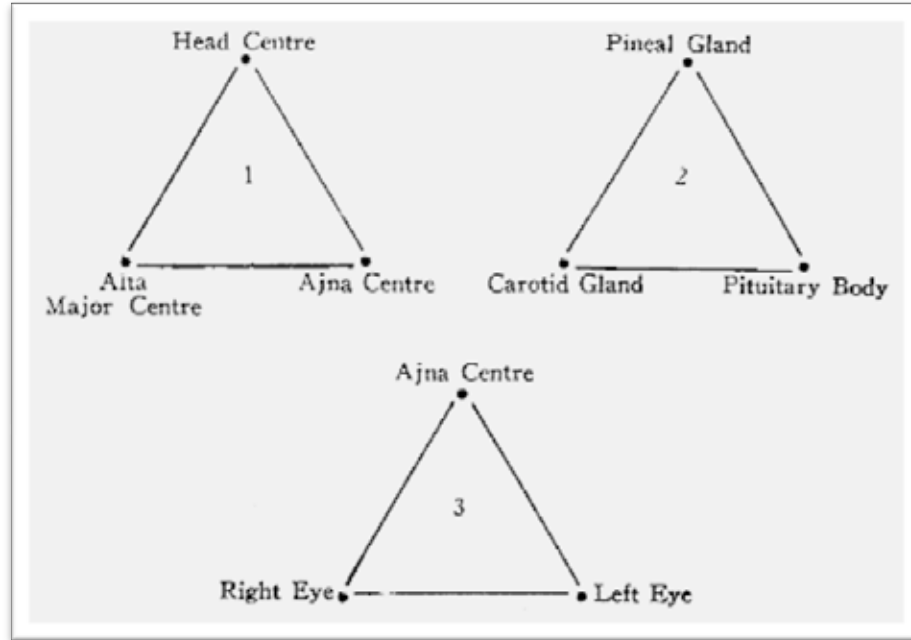


Figure 33.¹¹⁹ **Esoteric Healing head triangles (A.A.Bailey)**

These are the head triangles as depicted in *Esoteric Healing*. These triangles and others are “magnetic in quality and radiant in activity.”¹²⁰

Of all of these points, the alta major center is the last to become activated. The reason for this involves the waking of Consciousness -- antaskarana, sutratma and the antahkarana (energetic channels or threads), which are discussed in more detail in upcoming sections.

The Alta Major Chakra: Advancing the Mind in Spirit and Matter

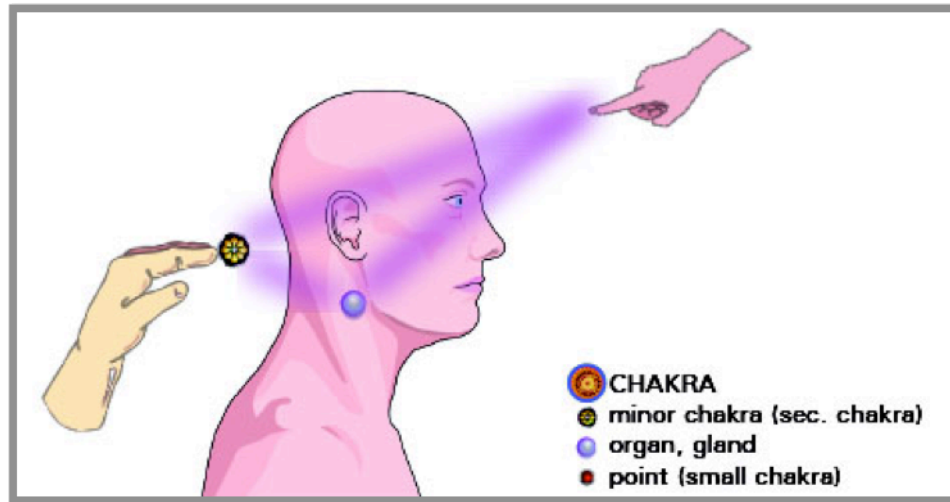


Figure 34.¹²¹ **Colored illustration of one of the head triangles Esoteric Healing (A. Hopking)**

In this image the left hand at the base of the skull points to the alta major chakra, in the etheric field, which aligns with the location of the cerebellum, medulla oblongata and the RAS. The finger on the right is pointing to the ajna center in the etheric field. The organ point is the bilateral carotid gland.

The alta major center is considered a minor chakra, but functions as a major chakra according the teachings of Master D.K. In the head triangle, the alta major chakra has a unique position, first because of its relationship in the head triangle and second, due to its powerful link to the cerebellum, the medulla oblongata, the spine and vagus nerve. The cerebellum is part of the hindbrain and controls voluntary muscles and, therefore, movement -- and is energetically linked to the root or base chakra. The medulla oblongata, also part of the hindbrain which is closest to the spinal cord and is involved with the regulation of heartbeat and heart rate, breathing, blood pressure and the reflex centers, as is the vagus nerve. The medulla is energetically connected to the throat and heart chakras. In Bailey's *Treatise on Cosmic Fire*, Master D.K. explains, "The alta major centre, **or that nerve centre at the top of the spine**, where the cranium and the

spine make approximate contact. When **this congery of nerves** is fully developed, it forms a centre [sic] of communication between the vital energy of the spinal column (the kundalini fire) and the energy of the two head centres [sic] above enumerated (in the pineal, pituitary, carotid triangle). It is the physical correspondence to the antaskarana [antaskarana is a thread or channel between the personality (lower worlds) and the higher worlds of Consciousness] on higher levels.”¹²² *Treatise on Cosmic Fire* was published in 1925, and it was more thirty years afterward that knowledge of the reticular formation first came to Western medical science. Therefore, I suspect Master D.K.’s words, “*that nerve center at the top of the spine*”, and “*congery of nerves*”; could represent what we see as the reticulum and currently call the RAS and reticular formation. To know if there is a correlation here, I assume a proper investigation will have to wait until there is a more robust imaging detector than the fMRI, since we cannot easily see the RAS using this current technology.

In the above Master D.K. quote, what is meant by “*nerves is (are) fully developed,*” has to do with the development of the antaskarana, and is part of the next discussion. According to Alan Hopking, an Esoteric Healing teacher based in England, “The development of the alta major center leads to an acquired and conscious control of one’s dharma or soul work on earth, a realization of what one is to do in life as opposed to being tossed about like a leaf in the wind (a reference to the creative thread of the pingala). It therefore has powerful connections with ancient memory.”¹²³

Considering the etheric placement of the alta major center and its alignment with the hindbrain, Hopking’s proposal of this center as a link to ancient or unconscious memories may have merit. The brain is mainly composed of three segments, the

cerebrum, cerebellum and the medulla oblongata. The cerebellum and medulla are the reptilian (hind) brain, referred to in the MacLean Triune Brain model; some neuroscientists postulate that they are seat of the unconscious brain. According to Master D.K., the alta major center's correspondence in the physical body makes this center the distributor of energy by way of the vagus nerve in the Consciously underdeveloped person; and in the Consciously developed person the sutratma assumes this function in harmony with the vagus nerve. The sutratma is the energetic life aspect; it anchors at the heart, runs with the spinal column (energetically), to the head (at the crown) and moves up through the crown to the Soul. The sutratma is also called the *silver cord* or *thread of life*, and is commonly referred to as the cord that is withdrawn at death.¹²⁴ These threads or channels are discussed thoroughly in the following section.

In regard to the magnetically influenced triangular connections, Master D.K. elaborates on these important activation sites, "The pituitary body (in all cases of correct normal development) forms the centre which receives the threefold vitalisation pouring through the sutratma from the lower mental, the astral, and the etheric planes. ... When the antaskarana is in process of utilisation the alta major centre is likewise employed, and the three physical head centres [Bailey's three triangles shown previously in Figure 33] begin to work as a unit, thus forming a kind of triangle."¹²⁵ Hopking adds, "When functioning, the alta major center has the power to bring down intuitive vision into consciousness. This center can be said to be the healer's conscious [Conscious] link with the higher mind, for through the alta major center our higher intelligence is activated through thought. And energy follows thought."¹²⁶ In the interest of clarity, "activation" is a natural evolutionary step in the spiritual development of one who is on the Path.

Activation of these triangles speaks to the magnetic and radiant connection of the body's physical physiology, coupled with its energetic physiology. It is not necessary to work with an esoteric practitioner to accomplish Spiritual development and Conscious awareness, though a teacher or guide can be helpful, as activation may require support and some outside assistance from time to time.

Alan Hopking, a health practitioner, founder of the Global Academy of Esoteric Healing and former teacher at the Alice Bailey Arcane School, wrote *Esoteric Healing: A Practical Guide based on the Teachings of the Tibetan in the Works of Alice A. Bailey*. In Hopking's supplemental texts, he illustrates and describes these images (see Figures 35 through 37) as, "...the etheric body in the human being."¹²⁷ Regarding the science of the etheric body, he states that, as healers, "We are called on to respect the human energy fields we enter: they are intricate, delicate, intimate, deeply personal and karmically sensitive."¹²⁸ Figures 35 through 37 depict these points clearly as they relate the etheric energy centers to human anatomy and physiology.

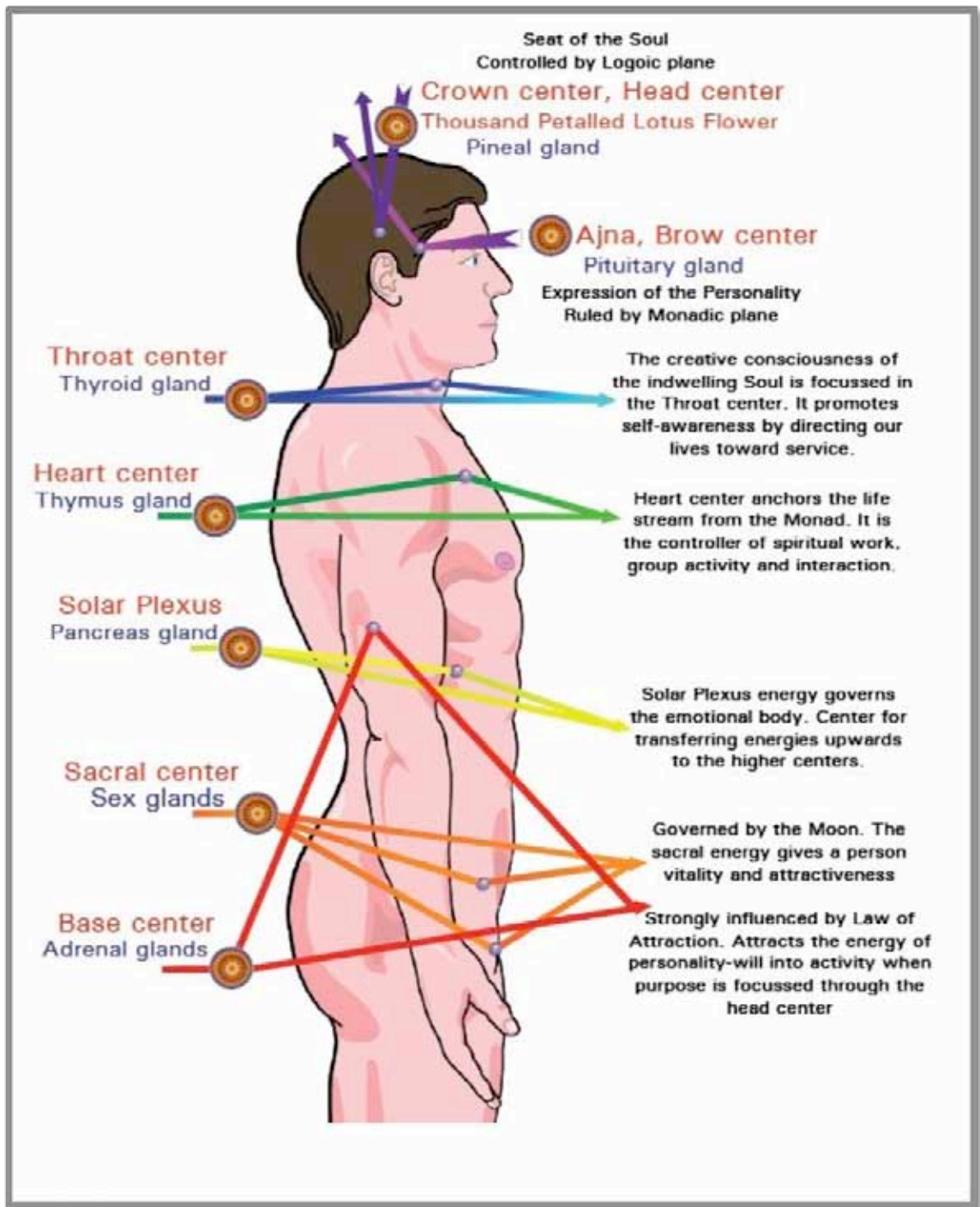


Figure 35. ¹²⁹ **Chakra centers with triangles (A. Hopking)**

This image shows Alan Hopking's interpretation of the triangles (only a few shown here), and how they may align over the body. Triangles are used in a sequence, specific to what is in need of activation and for radiant support. These triangles are activated in the etheric body through visualization of radiating light offered by the practitioner who is using the esoteric healing techniques, as originally presented by Master D.K. in the Alice Bailey texts.

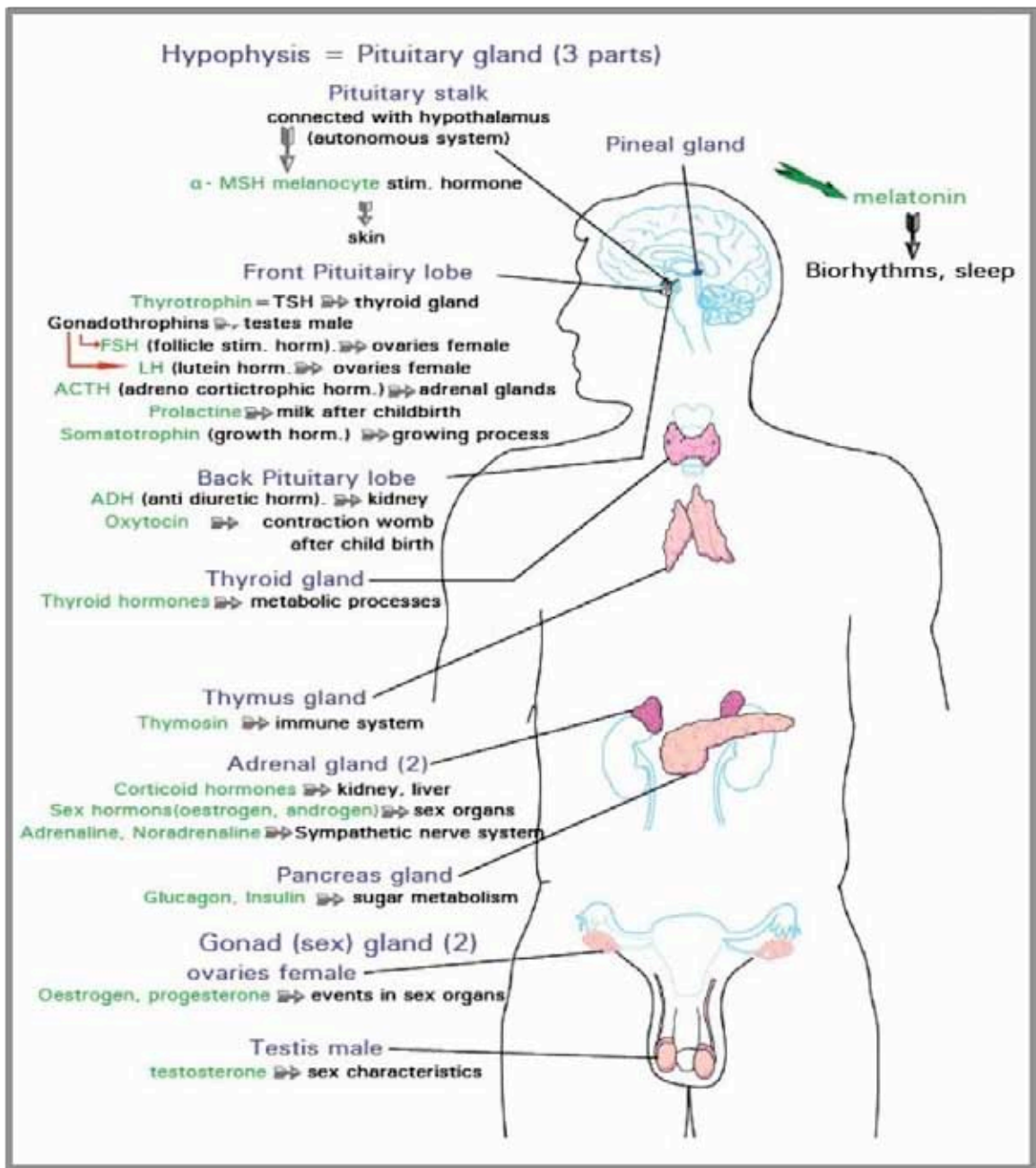


Figure 36.¹³⁰ **Endocrine gland correspondence to chakras (A. Hopking)**

This image demonstrates the glandular system and the various hormones stimulated by the corresponding gland. The next image (Figure 37) includes these glands in the overlay with the chakras. Energetically speaking, the glands are denser energy channels as they are in the physical body, and coordinate with the nervous system as a whole. Major chakras are believed to correspond to major nerve bundles in the physical body. “The nervous system as a whole (consciousness stream), and via the endocrine glands into the blood stream via hormones (the life stream).”¹³¹ The importance of the endocrine glands cannot be overstated.

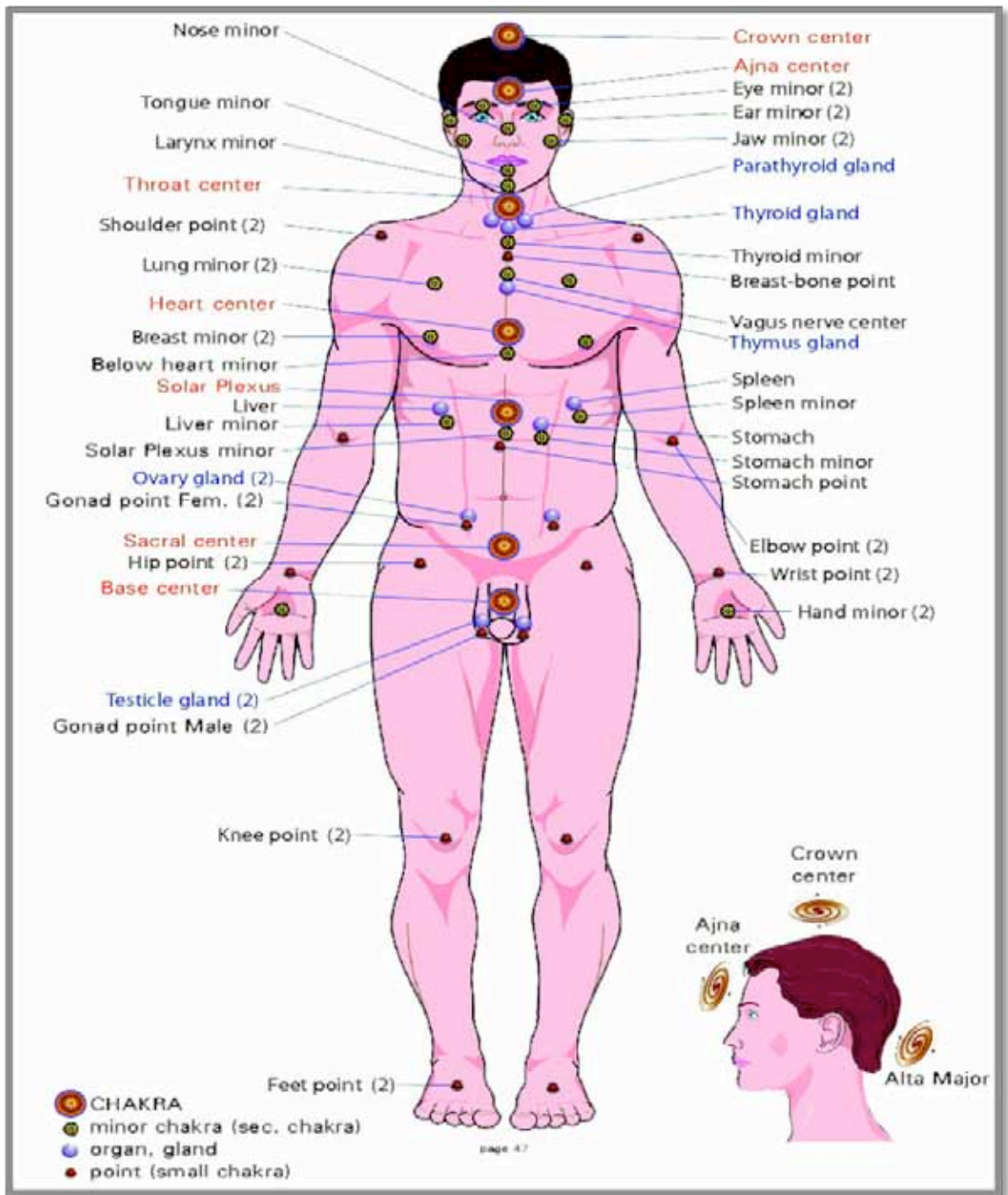


Figure 37.¹³² **Overlay of glandular system and the minor and major chakras**

This image exhibits the overlays of the glandular system (in blue) as well the minor chakras (medium-sized yellow and black circles) and major chakras (multi-color circles). The small red circles point to ‘minor chakras’, which are key points along the body’s energy channels; these behave similarly to other chakras, but are less energetically dense by comparison to the major chakra points. The inset image of the head shows the three chakras as spinning vortices, and make up the three points of one of the head triangle sequences.

According to Hindu cosmology, within the human etheric body or energy field, there are seven major energy centers called chakras (Sanskrit for "spinning wheels"). These are arranged linearly along the vertical spinal axis from the perineum to the crown of the head. Some schools teach that there are as many as forty-nine minor chakras distributed throughout the body. The major chakras are believed to be similar to electrical junction boxes or energy transducers for the physical body. This teaching may relate to the third Principle of Vibration as described in *The Kybalion* as, "Nothing rests; everything moves; everything vibrates." The seven major chakras, which are always moving even when the body is at rest, correspond with the seven principal endocrine glands, as well as organs in the same region of the body. Much in the same way, the earth maintains its orbit and yet is in constant motion. Balance is a dynamic process.

The Physiology of Choice – What Comes with Age

The physical human body naturally matures, but spiritual growth is not always commensurate with physical growth. The alta major center or chakra is about cultivating a relationship with Spirit, and, like any relationship, it takes work. Conscious awareness and the Spiritual Path take effort. In an esoteric sense, vitalization and activation follow desire, which becomes more Soul-directed as we move along the Path, if we choose to do so.

The frontal lobe contains the brain's neocortex. It is understood by modern neuroscience to be the region of critical thinking and executive reasoning, and is the most recently developed lobe in the human brain's evolution. It is estimated that this region is not fully developed in women until the age of twenty-one and age twenty-five in men.

Might these ages correspond to our first conscious/Conscious crossroad in life? At these ages we are considered adults and key personal choices are usually made. These choices, when reflected upon, might demonstrate how our earlier decisions affect our emerging life-stages and self-discovery.

Despite earlier neuroscientific assessments to the contrary, the brain continues to develop and change well into adulthood. William James, a psychologist, first introduced the word *plasticity* as a characteristic of the brain in 1890. It is likely that because James was not a neuroscientist, his visionary concept was not adopted. In fact, it is only within the last year (2009-2010) that neuroscientists have updated medical textbooks about the changeable “plastic-like” nature of the brain. If we really are indeed Spiritual Beings on a human journey, how might knowing of this plasticity serve to shape our brain, and come to inform c/Conscious decision-making?

Several visionary neuroscientists are bringing new information regarding brain mapping, plasticity, dermal optical sensitivity, mirror neurons and more emerging concepts. Some teams are researching regions, within the brain, where they believe spirituality might be located. These are all worthwhile and necessary pursuits on our human journey to understand brain function, but when it comes to Consciousness and our relationship to Spirit, I believe we need to reach further than our cranial vault. At this point in our research, a synthesis of esoteric teachings and our scientific models is needed. During a keynote lecture at the 2010 Energy Psychology Conference, Norman Doidge said, “Plasticity is not your friend, but knowledge of it is.”¹³³

What choices are we making? Are they habitual and/or are they healthy? How do we purposefully develop ourselves in a Conscious way? Are we at a place and time in our evolution at which we can accept the power of our mind, even if we are uncertain of the precise location of the mind? How do we direct our creative fire? Ted Andrews is a teacher and author who re-synthesizes ancient scriptures, literature and teachings for use by the contemporary spiritual student. In his simple, yet profound book, *How to See Auras*, he explains how the subtle-bodies are developing Consciousness in utero. Andrews explains, “There is a subtle interaction of the body with the energy fields of the heavens.... Keep in mind that everyone has his or her own unique energy system, and the way it interacts and works with the more subtle surroundings (the) influences will vary from individual to individual. With a little study and self-observation, you can increase your perception of these influences and learn to work with them more creatively and productively.”¹³⁴ This is a choice.

Science of the Triple Thread: Antaskarana, Antahkarana and the Sutratma

The roots of mystical wisdom, fundamental esoteric teachings and occult teachings can be traced to ancient Egypt. Their philosophies were available to anyone who gathered there to learn from the Adepts and Masters. The land of Egypt was known as the Great Lodge of Lodges of the Mystics. Many nations and cultures have borrowed from these teachings; among them are ancient Greece, China, Persia, Rome, Japan, India and Tibet. I find, in the volumes of Alice Ann Bailey texts, the clearest synthesis and the most abundant of the ancient esoteric teachings. I will, therefore, continue referring to this material, except in instances where other sources are introduced. It is worthwhile to

note that much of my personal study has involved *The Kybalion*, and it is here that I continue to find clues to guide my study when the usually reliable Bailey texts present a particular teaching ambiguously.

In *Education in the New Age*, Master D.K. (through Bailey) explains, “The Science of the Antahkarana is the science of the triple thread, which exists from the very beginning of time and links individual man with his monadic (Divine) source. The recognition of this thread and its use, consciously, as the Path and the means of ever expanding contacts, comes relatively late in the evolutionary process. **The goal of all aspirants and disciples is to become aware of this stream of energy in its various diversifications and consciously to employ these energies in two ways:** interiorly in self-unfoldment, and in the service of the plan for humanity.”¹³⁵

As awareness (or “self-unfoldment”) builds, centers in the etheric body are activated and embody radiant power. Earlier, I explained “...the vagus nerve is most active when we are Consciously underdeveloped.” The key to developing Consciousness is the fusion of the physical and the etheric bodies. This requires the integration of aspects (shadow and light) of our subconscious-self. “The stream of energy is the antahkarana itself – the light *is* the energy. The fundamentals are:

1. The *life thread* comes directly from the monad or the ONE. This thread is anchored in the heart at incarnation. There is the seat of life.
2. The *consciousness thread* comes directly from the soul. It is anchored in the head. There is the seat of consciousness.
3. The *thread of creative activity* is initiated and constructed by the human being. It is anchored, when sufficiently constructed, in the throat. This thread is an extension or synthesis of the two basic threads.”¹³⁶

The creative thread is trifold in quality. These three self-constructed threads are created gradually within the developing person. As Consciousness dawns, the expression and material development of these threads (life, consciousness, creative) quicken.

Ultimately, “these three self-created threads constitute the third thread of the antahkarana and extend eventually:

1. From the physical body to the etheric body, passing from the heart to the spleen, and thence to the body of prana, the vital or etheric body, unites with force from the egoic will petals.
2. From the etheric body to the astral body. This thread passes from the solar plexus to the heart and from thence to the astral body, picking up the energy of the thread mentioned above, unites with force from the love petals.
3. From the astral body to the mental vehicle. This thread passes from the ajna centre to the head centre and from thence to the mind body, picking up energy of the other two threads mentioned above, unites with the force from the knowledge petals.”¹³⁷

Finally, these threads are woven into one, yet they remain distinct. The antahkarana is depicted as a thread in the teachings because it is the medium of light transmission. Very simply, the creation of these threads is first the product of desire and second, by the discipline of mind and intelligent action, which is spawned by meditation and active practice. The complete process of creating and unfolding these threads would fill several books, and, in fact, do. Enough detail is presented here to understand the spiritual connection that is established on opening and activating the alta major chakra. However, the aspects of intelligent activity or the responsibility regarding creativity cannot be taught in a thesis of this scope. That process is a personal venture.

I quote Master D.K.'s guidance for our journey:

*“It will be apparent to you, therefore, that the whole goal of the future and of the present effort is to bring humanity to the point where it – occultly speaking – enters into light.”*¹³⁸

The science of the antahkarana deals with the entire incoming system of energy. Therefore, the knowledge of this energy system brings with it transformation and fusion, leading eventually to the formation of the sutratma. The sutratma is one of the three threads formed, as a result of dedication and discipline on the part of a person, but the person does not create it, directly or individually. When the texts say, “these are threads of [hu]man’s own making,” this is speaking to the willingness of the initiate. It is constructed from the co-creative Conscious relationship between Spirit and human. The sutratma is the silver cord of life-force energy.

Mikio Sankey, a California-based, Chinese medicine doctor who created and administers Esoteric Acupuncture, explains, “The antahkarana is the major pathway for connecting to our lower, everyday consciousness with our highest and [S]piritual [C]onsciousness. It is also known as the ‘Rainbow Bridge’ or the ‘Bridge of Light’ and is a wave length frequency consisting of three main components of energy fields. Although everyone has all three components, one of the three requires additional work to be built upward from the individual back to the Soul and Monad.”¹³⁹

Here it becomes apparent that we are talking about building a bridge from the lower ego mind to higher mental planes. There is an etheric channel, which we must cross, at the alta major center. Bridging this etheric gap involves creating an ephemeral thread, which is called the *antaskarana*. Once constructed this bridge becomes the thread of the antaskarana, which is the path of communication between the human personality

and its Soul. Master D.K. elaborates, “Part of the work of the [hu]man who is developing thought-power has to do, is build a temporary channel in the etheric matter to bridge the gap, this channel is the antaskarana.”¹⁴⁰ The antaskarana is another of the three major threads, which are developed as one evolves on the Path. As written in Bailey’s *The Light of the Soul*:

It is all one path, but the Path of Initiation has to be trodden consciously by the thinker functioning through the central organ in the head, and from there intelligently traversing the Path which leads through the three worlds to the realm or kingdom of the soul. It might be stated here that the awakening of the heart centre leads a man to consciousness of the source of the heart centre within the head. This in turn leads a man to the twelve-petalled lotus, the egoic centre on the higher levels of the mental plane. The path from the heart centre to the head, when followed, is the reflection in the body of the building of the antaskarana on the mental plane. "As above, SO below."¹⁴¹

The eventual goal is that the antaskarana becomes so finely intertwined with the antahkarana that it becomes almost indistinguishable. The antaskarana becomes what was merely formed for the purpose of bridging oneself to the higher mind; it shows commitment to know oneself and Spirit. It is a choice, not a test. “This comes at a time when the human unit consciously aspires and throws his will on the side of evolution, thus making a constructive life.”¹⁴² This ego-will versus Divine-Will is a fiery process, and is one of the portals of initiation. Master D.K. advises,

Students should train themselves to distinguish between the sutratma and the antahkarana, between the life thread and the thread of consciousness. The one thread is the basis of immortality and the other the basis of continuity. Herein lies a fine distinction for the investigator. One thread (the sutratma) links and vivifies all forms into one functioning whole, and embodies in itself the will and the purpose of the expressing entity, be it man, God or a crystal. The other thread (the antahkarana) embodies the response of the consciousness within the form to a steadily expanding range of contacts within the enviroing whole.¹⁴³

In other words with conscious choice and awareness, bridges are built between the physical human vessel and Spirit, which create a synthesis of form and intelligent knowledge. Master D.K. offers these words to visually imagine: “Like a spider, mans spins connecting threads, and thus bridges and makes contact with his environment, thereby gaining experience and sustenance.”¹⁴⁴

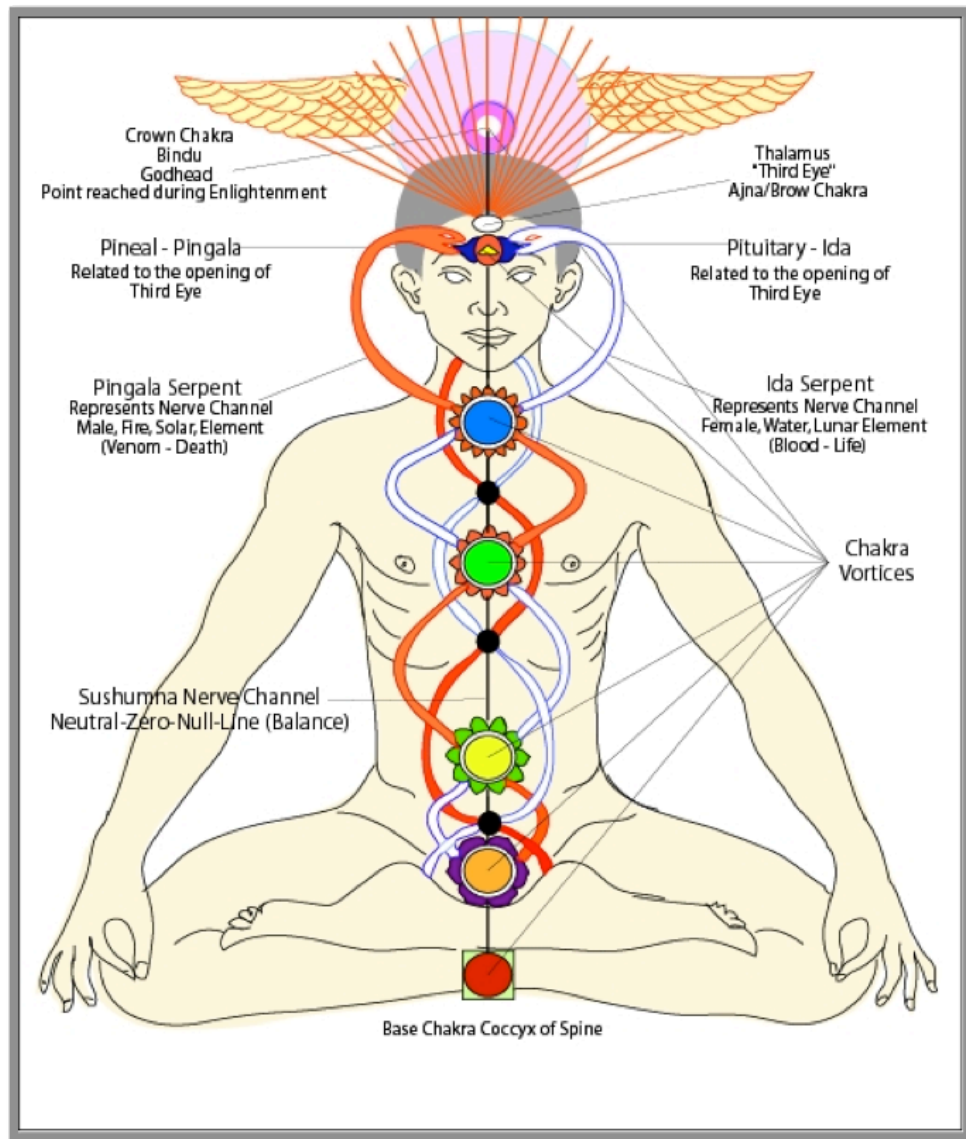


Figure 38.¹⁴⁵ **Points of enlightenment in the body according to Vedic philosophy**

This image uses Vedic language, but it represents the fully developed and energetically activated sutratma, antaskarana and antahkarana. Illustrated as well are the major chakras. Sushumna (thin center line) represents all three threads (or currents). The ida and pingala represent the male and female subconscious mind aspects, but do not form threads as this image implies. The raising of kundalini energy occurs with the development of the antaskarana and antahkarana, once they are empowered and intertwined -- this is not appropriately presented here. The connection through the crown chakra represented by the wings is the Monad (Mind of God).

CHAPTER 8: IN THE EYE OF THE NEEDLE, WE ARE THE THREAD: HOW DO WE SOW?

“Professional work of any sort tends to narrow the mind, to limit the point of view and to put a hall-mark on a man of a most unmistakable kind.”

-- Sir William Osler

The concept of the Monad is rich and complex, and is well covered in the teachings of the Theosophists. At the most basic level, the Monad is the spiritual component of our personality and ego. Charles Webster Leadbeater (1854-1934), a teacher in the Theosophical Society, wrote in his essay titled, *The Monad*, “Often a student asks: ‘But what have we to do with it (Monad) while we are down here – this unknown glory so far above us?’ It is a natural question, yet in reality it is the reverse of what should be; for the true [hu]man *is* the Monad, and we should rather say: ‘What can I, the Monad, do with my ego, and through it with my personality?’”¹⁴⁶ In other teachings the Monad can also be related to as the High Self. Some teachings relate the Monad to the Soul as well, but this is confounding when dealing with persons whose cosmology is based in some interpretations of Christian teachings. Simply, the Monad is a spiritual presence, yet it informs the ego and personality selves after the antaskarana (bridge) is built. This Monadic presence is part of each member of humanity and it takes an inner desire to know this part of our Spiritual Essence.

The work of an initiate is described thus in Bailey’s *Treatise on White Magic*: which states, “The goal of all the work of the aspirant is to understand those aspects of the mind with which he has to learn to work. His (the initiate’s) work therefore might be summed up as follows:

1. He has to learn to think; to discover that he has an apparatus which is called the mind and to uncover its faculties and powers.
2. He has to learn next to get back of his thought processes and form building propensities and discover the ideas which underlie the divine thought-form. He has to learn to penetrate into the world of these divine ideas... and begin to work with the blue prints upon which all that is, is modeled and molded. Not become an idolater (one who blindly or excessively admires or adores another), but divine idealist.
3. From that developed idealism, he must progress into realms of pure intuition. He can then tap truth at its source. He intuits as well as idealizes and is sensitive to divine thoughts. They fertilize his mind. He calls these intuitions later, as he works them out, ideas or ideals, and bases all his work and conduct of affairs upon them.
4. Then follows the work of conscious thought-form building, based upon these divine ideas, emanating as intuitions from the Universal Mind. This goes forward through meditation.”¹⁴⁷

The initiation process takes focus and concentration. The key here is meditation, as the last line of the quote mentions. How is this practical in modern society?

There are scores of studies yielding positive and statistically significant results using meditation to treat people who have measurable amounts of stress, depression, anxiety, and reduced immune function. Several pilot, follow up, and (recycled) waitlist studies reveal that people who engage regularly in meditation practices score higher on validated quality of life measure tests. Whether the desire is to engage on the Path to self-unfoldment, or just to get through the day with as little immune system damage as possible, there is evidence that meditation is a sound way to find some modicum of balance.

The esoteric acupuncturist, Dr. Sankey, uses these teachings in a revolutionary way. In the first of his five volume treatment of *Esoteric Acupuncture*, published in 1999, Dr. Sankey tells us that, before now, humanity may not have been evolved enough to receive these esoteric teachings. However, he believes that the time has come for appreciating and grasping the full extent of what acupuncture has to offer, and integrating this knowledge with the ancient wisdom and the energies of the Age of Aquarius. He goes on, “Healing in the 21st Century will increasingly involve the manipulation of frequencies and subtle energies through various methods, and Esoteric Acupuncture is certain to become one of the most powerful forms of the ‘New Age Healing.’”¹⁴⁸ I agree with Dr. Sankey, and would add that, quite possibly, any modality that strives to integrate esoteric healing traditions, might serve to create a more holistic model of wellness, including self-care and Spiritual development.

Dr. Sankey uses the triangular patterns, which are presented in Alice Ann Bailey’s work in his Esoteric Acupuncture treatments. He describes this treatment as, “... specific acupuncture needle sequencing to balance the body by attuning all the supporting energy systems. Sessions include tongue and pulse analysis and sequencing of acupuncture needles in sacred geometric formations to support and deepen the flow of qi throughout the body.

Discern the Whisper Pattern: Heals Emotional heart
Spirit Path Pattern: opening to inner wisdom
Indigo Triangle Pattern: Increases awareness and intuition
Cube on Cube Pattern: Increases ability to create a balanced life
Crown Infinity Pattern: increases intuitive creativity in life
Esoteric Shaoyin Heart Pattern: Opens heart, and kidney energy, deepens a person’s self-actualization”¹⁴⁹

While researching esoteric healing applications, I found that Dr. Sankey's creative work is one of the more respected applications of integrated medicine. Though still on the fringe, acupuncture has achieved a foothold in many hospital settings. Such was not the case just a decade ago. I am hopeful of advanced thinking with regard to Western medical practices. Whether obvious to them or not, many doctors have had spontaneous healing cases in their practices. Medical doctors, by saying, "It's a miracle" often sum up the cases of patients whose results cannot be explained in typical medical terms. There are several oncology clinics opening around the country that blend Medical Qigong, Hands-On Healing, Music Therapy, Bio-feedback, Reiki and Anodyne Imagery (pre-surgical hypnosis), along with many other modalities.

BRINGING IT DOWN TO EARTH

*Each morning we are born again. What we do today is what matters most.
--- Buddha*

According to ancient teachings, energy moving in both directions through, as presented here, "threads", is vital for both the development of life-force energy centers, and, the development of Divine Will within Spiritual Consciousness.

Josiane d'Hoop is an esoteric teacher and a multi-disciplined practitioner who blends her skills to suit the individual client in her healing practice, based in North Carolina. d'Hoop began her studies of the Alice Bailey material in 1994, and now teaches group and private classes for those seeking a deeper understanding of esoteric healing.

During one of my private lessons, she offered a clear and important explanation regarding grounding energy in the physical body. I asked, “What does grounding mean to esotericists and why is it necessary?”

d’Hoop answered: “Basically the function of the cerebellum (which aligns with the alta major center) is like the breaker-box in a house. When you build a house, all the electrical circuits connect to a breaker-box. This connection allows the electrical energy currents to flow throughout the house. If the house is not grounded, there is a strong potential for a short-circuiting to occur.”¹⁵⁰

The metaphor d’Hoop uses relates to the physical body’s brain and nervous system. Physiologists, especially neurophysiologists, refer to these parts of the body as electrical in nature. If there is too much electrical current, as in someone who is hyperactive or hyper-stimulated/aroused, it could short-circuit the nervous system. In similar manner, if there is reduced energy flow through the nervous system, it may result in a state of hypoactivity. “Short-circuiting” in the brain and nervous system is usually obvious, such as in cases where lesions or scars are blocking signal transmission, but even simple stress responses throughout the day can upset the body’s ability to effectively communicate with itself. If you will recall from earlier sections covering neurophysiology and the nervous system, there is a constant flow, through the brainstem, of afferent and efferent signals communicated by neurotransmitters; the function of these signals is to maintain a dynamic equilibrium. The RAS-Vagus-Alta Major Chakra Axis, I believe, describes the communication hub of the human being -- body, mind and Soul. d’Hoop explains that until there is fusion between the personality consciousness and Spirit Consciousness, the vagus nerve is commanding the rhythm of the entire body.

In Bailey's *Esoteric Healing*, the volume that deals with the basic causes of disease-states in the physical body, Master D.K. explains:

There are two powerful centres connected with the vagus nerve: the heart centre and the centre at the base of the spine. These two, when brought under the control of the soul, functioning through the head centre (the brahmarandra), produce the raising of the kundalini fire. This, when taking place, swings the entire nervous system into a special form of rhythmic activity and responsiveness, and it is through the stimulation and the control of the vagus nerve that this is accomplished. It is not the vagus nerve which is instrumental in raising the kundalini fire, but the reverse situation. When the head, the heart and the centre at the base of the spine are in magnetic and dynamic rapport, producing a radiatory effect, then they affect the vagus nerve and the fires of the body are unified and raised, producing purification and the "opening of all doors."¹⁵¹

In my healing practice, I find this "commanding rhythm," that Master D.K. and d'Hoop speak of, is often evident in my clients, who may feel overwhelmed with stress, and may carry traumas stored within their bodies.

In the healer/therapist community, the word "grounding" is often used when referring to a body/mind fully invested within the physical plane within this time/space reality. Among the clients I encounter in my healing practice, I find that people who are suffering from delusional, dissociative or borderline disorders are frequently ungrounded and not present-minded. Some may best be described as "disconnected", implying that they have lost touch with reality.

As a population, we are becoming increasingly aware that stress can have remarkable effects on our bodies and on our states of mind. In cases where a person is encountering chronic stress, the effects can be devastating and life threatening, often overwhelming the ability for one to cope with vicissitudes everyday life. It appears to me that stress and/or trauma lie at the root of all of the ailments presented by my clients – so far I have found no exception. This has also been true for the veteran therapists by whom

I was taught and others whom I have interviewed. The relationship between nervous system health and stress management has been the source of many investigations. There is an undeniable connection between stress and illness. Vagal tone, often assessed during physical exams, may be associated with varying levels of stress and may indicate how a person's body might be responding to stressors.

Dysfunctions of the vagus nerve have been implicated in many disorders. Some of these disorders were discussed in the chapter on the nervous system and the vagus nerve. In the Western medical model, the vagus nerve is sometimes treated mechanistically for the management of epilepsy and chronic depression, as is the case with the use of vagus nerve stimulators, mentioned in the section on the nervous system. There are multiple internet-based forums attesting to dissatisfaction among people who have undergone the surgical procedure to have a VNS implanted in their bodies. Alarmingly, there was little positive change in the condition of the patients who received the device, nor was there encouragement to others to undergo the procedure. This evidence is supported by information in the medical literature. Clearly, the implanted VNS device is not going to manage stress for the recipient, and, in fact, may require medical management in the nervous system to prevent an "electrical storm". These electrical-storm issues are on the rise according to the current (2010) medical literature. The VNS is a wonderful mechanical idea, but the application may not be a reasonable long-term solution.

The National Institute of Health's Pub Med website alone contains nearly two thousand papers and studies of psychological and physiological issues relating to the vagus nerve and its functions. Master D.K.'s teachings on the nervous system are

plentiful, but concentrated mostly in the two volumes of *Esoteric Psychology*, published in 1936 and 1942 respectively. In volume II Master D.K. states:

The activity of the head centre is as yet little known and there is little that I can profitably say about it, for I would not be credited with speaking the truth. This centre is the central factor in human life, but the focalisation of the lower and the higher bodily forces is not yet located there. Beyond producing hyper-tension (becoming so prevalent today among the more advanced people of the world) and certain forms of brain trouble and nervous disorders, its power is mostly seen in its pronounced psychological effects. With these I shall proceed to deal as we consider the unfoldment of the psychic powers, the evolution of the mystical vision and the revelation of the light and of power. This centre controls the pineal gland and consequently certain areas of the brain. Indirectly also, the vagus nerve is affected. Consciousness and life, sensitivity and directed purpose are the great energies which express themselves through this (head) centre, for consciousness is a form of energy, as well you know, and life is energy itself.¹⁵²

Our power is in the here and now, and is focused in our physical bodies. Whether or not we choose to acknowledge a psychic power potential as presented by Master D.K., I believe anyone can recall times when they have both listened and not listened to their gut instincts. This “psychic power” I believe, is no different than our innate ability to receive and respond to these gut instincts. The quotations from Alice Bailey and Master D.K. in this final section serve to inform us that we have the choice to experience Spiritual development or not. I believe the time has come to reconnect with our true nature, which is both physical and Spiritual. The RAS-Vagus-Alta Major Chakra Axis speaks to the anatomy of Spirit in the self.

Dedication to the Path of Consciousness means that the activated alta major chakra will become the distribution center of life-force energy. This life-force energy moves down and up the antahkarana, the energetic spinal column, radiating magnetically to open the chakra centers. The RAS is the network hub of the physical nervous system, sending and receiving signals, creating connections using the endogenous hormones,

neurotransmitters and neuropeptides that move throughout the body. The vagus nerve carries the signals that coordinate these collective movements and activations, creating a homeodynamically balanced nervous system within the body. As you will recall, Magoun and Moruzzi discovered that the reticular formation was the area of the body that aroused the cortex of the brain. I am proposing that this RAS-Vagus Nerve-Alta Major Chakra connection is an axis, which acts as a communication nexus between the physical systems and Consciousness, which when activated consciously can arouse a profound Spiritual connection. It is our choice to make.

CHAPTER 9: CONCLUDING THOUGHTS

The Human Operating System has hardware, which is the body; and software, which is the mind. So what's the problem? Perhaps we have forgotten the password.



A Spiritual relationship with the Divine is for the most part ineffable and otherworldly. It is also deeply personal. As I was putting together the pieces for this foundational discussion of this proposed axis RAS, Vagus Nerve and Alta Major Chakra, I was consistently considering the meaning of emotion and how emotions may affect our physical bodies. I consider emotions as indicators of congruence or incongruence between thoughts and beliefs. Emotional expression may be a compliment, or a challenge to imbedded beliefs. These emotional expressions offer an opportunity for self-discovery. Experiencing emotions allows us an opportunity for an inward journey, where we might ask, “What am I feeling? -- Why am I feeling this? -- Is there something I can do about the way I am feeling?” It is important questions like these that allow for

learning, self-awareness and present-mindedness -- and to investigate how feeling our emotions may alter our physiology. In essence, this is the mind-body-spirit connection. I believe it is no longer sufficient to separate these pieces of mind-body-spirit. Since research teaches research, separating mind and body and Spirit, may have been a useful step in the process of our scientific exploration and investigation. In the last decade (2000-2010) however, many members of the scientific community have found that reducing these parts down to their individual operations, creates an incomplete picture. As soon as we reintroduce the parts, we are befuddled by the mystery of how it all operates collectively. I believe there is room for both subjectivity and objectivity in science -- they are simply two different measures. Perhaps much of what is taught in scientific design and clinical application should be viewed as guidelines rather than rules.

Dr. William Bengston, an author, scientist and professor of statistics, recently stated, while addressing an auditorium of scientists and practitioners, "Researchers need to know a little something about how the clinician uses various modalities, and the clinician needs to be aware of the research. These two groups should ideally be informing each other."¹⁵³ For the most part, researchers and clinicians have been operating separately. I believe it is time for multi-modal and community research projects that make allowance for the anomalous, the subtle and the unseen. Anomalies make our heads hurt. They cause us to think about what we do not know, or question what we think we know. Our beliefs about what is, or is not possible, create wrinkles in our perceptions. And what governs that which we actually see? Teasing out the answers to these puzzles will take time and patience, but to take up these challenges requires that we walk into the anomalies, not discard or ignore them.

In multiple lectures, Bruce Lipton explained that cells are either in growth or in protection. Wisdom Masters taught that there are only two emotions, love and fear. The experience of growth, protection, love and fear, can be catalysts for cultivating knowledge of self and expansion. I believe these are essential pieces of self-discovery on our journey to spiritual advancement. The relationship of the RAS-Vagus Nerve-Alta Major Chakra Axis is about communication with the Divine and with the self. I propose that the RAS is a communication energy center for physical consciousness, and the vagus nerve with its nearby outcropping, is a messenger of psychological and physiological information. The Alta Major Chakra completes a life-force triad, thereby allowing a bridge to be created with Spirit Consciousness. Each of these systems is part of an energetic feedback loop, from consciousness to Consciousness and vice versa.

Another of the Hermetic Principles written in *The Kybalion* is Mental Transmutation, which is presented this way: “Mind (as well as metal and elements) may be transmuted, from state to state; degree to degree; condition to condition; pole to pole; vibration to vibration. True Hermetic Transmutation is a Mental Art.”¹⁵⁴ In this regard, we could say it is mental chemistry, which affects the physical chemistry. In the Hermetic cosmology this is called the *Art of Mental Chemistry*, which is a form of mystic psychology and esoteric healing. First, we learn how to focus thought and use the mind; second we learn to choose consciously; and third we learn to allow for mystical unfolding and relationship with the Divine, however we perceive the Divine.

The ancient Greek scholars inscribed, “Know Thyself and Nothing in Excess” at the entrance to the Temple of Delphi. Learning to know one’s self requires dedication and awareness; and nothing in excess, requires knowledge of how to strike a balance.

I believe our scientific reductionist leanings have tilted us out of balance. Leaving subjectivity out in our methodologies means emotional/sensory content is denied its relative importance. From where I stand, it appears the studies involving emotions and senses have allowed for interesting investigations in neuroscience. Science and mysticism belong together. As we become more comfortable in the mystery of our evolution and what science unfolds in our exploration of it, we may create an opportunity to learn more about human form and function, along with spiritual development. The time has come for us to embrace energy as information. It is time to take responsibility for the imbalances and the balances we create. It is time to remember who we are, and how powerful we might be. I introduce this Axis of the RAS, Vagus Nerve and Alta Major Chakra, as a step toward reviving ancient esoteric teachings, and I suggest that we apply these teachings to our modern way of studying our physiological relationships to presence and to transcendence.

Please remember that this discourse is put forth during times of change in many areas of scientific pursuit. What we have stood on as truth, which felt solid at the time, is now, very possibly, up for review. If you, the reader, are left hungry for more and are asking: *What's next; how do I apply this information in practical ways*; then this foundational journey has been successful. There is much, much more to come.

We now, together, stand at a promontory ready to build our bridge.

Science and Spirit have been on opposite sides of the chasm for far too long; dogmatists in medical science on one side, and deeply embedded religious beliefs on the other. Throughout the last chapter of this thesis, we have learned that our Spiritual

development begins from the inside, building an internal bridge with durable and purposeful center pillars (channels) to the Divine. Similarly, in the physical world, modern bridges are constructed by creating sturdy, yet flexible center pillars. The laws of nature will bring together those who are willing to do the work -- and we will build, internally and externally, bridges for the next phases of our development and evolution.

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APPENDIX A

Email Correspondence between Dr. Bernard Baars and Tiffany Barsotti

From: Tiffany Barsotti [<mailto:tiffany@healandthrive.com>]

Sent: Tuesday, March 30, 2010 2:11 PM

To: 'Bernard Baars'; bbaars@comcast.net

Subject: A quick question (I hope)

Hello, Dr. B.,

In this article: J. Parvizi, A. Damasio / *Cognition* 79 (2001), you sent me last week – thank you again – there is something I do not completely understand. I bolded below – Why is this “less intriguing”? Is it because they found the only service of the brainstem nuclei is to keep homeostasis?

Personally I believe in homeodynamic over stasis – as we are always balancing internal and external signals; and I believe there is a lot more going on in the body than just stabilization. Co-factors of consciousness related to how we process stress, trauma, joy, food, anger, fear and inflammation -- make the brain chemicals and their flow VERY intriguing.

This conclusion is a bit confusing to me given the content of this article. I would love your take on this.

4. Concluding remarks

The multiple dimensions which describe the overall current state of the organism are mapped in several groups of brainstem nuclei. We believe that this comprehensive and continually changing map of the organism state creates a functional context for the brainstem nuclei whose activity can modulate the operation of rostral brain structures, namely those in the cerebral cortex. In addition, the map of the organism state, along with the fact that such a state is being changed as a result of an interaction with an object, can be signaled to rostrally located structures and be remapped. We see the remapping of the changing organism state in relation to a causative object as the basis for the experience of knowing, the very core of the process of consciousness and self.

The brainstem is the source of several ascending neural pathways, each of which originates in distinct sets of nuclei. These pathways, which reach widespread regions of the cortex either directly or via the thalamus and the basal forebrain, affect the operations of the cerebral cortex both by modulating aspects of its overall activity (and leading to wakefulness and attention) and by conveying to specific regions the contents with which a subjective sense can be created. In the framework outlined at the outset of this article, consciousness is grounded

in both of these brainstem roles: providing an organism-based context for the modulation of rostral brain structures; and conveying signals necessary to represent the caused changed state of the organism within rostral structures. **The intriguing overlap of functions attributable to the several families of brainstem nuclei - emotion, wakefulness and sleep, basic attention, and of course consciousness itself - becomes less intriguing when it is seen in the perspective of homeostasis, the ultimate physiological role of all the operations in which these nuclei are involved.**

With love and kind thanks,
Tiffany

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A Therapeutic Practice Encouraging Bodymind Wellness

"Let's Face the Music and Dance"
- Irving Berlin

[Reply] From: Bernard Baars [<mailto:baarsbj@gmail.com>]
Sent: Tuesday, March 30, 2010 2:37 PM
To: Tiffany Barsotti
Subject: Re: A quick question (I hope)

I agree with you, Tiffany. On both points.

What they are saying --- incorrectly --- is that csns is in the brainstem. That is only true for the on/off switches for the conscious state, as far as we know. For humans, it's the cortex that's the most interesting place for the CONTENTS of consciousness. The evidence for that is overwhelming.

There's a territorial dispute over different parts of the brain wrt consciousness. Sometimes it's a useful debate, but a lot of the time it's not. I don't think this version of "it's my piece of the brain!" is all that useful.

We want to keep an open mind, obviously. The reticular formation is very interesting, and my good buddy Bjorn Merker has made a case for the zona incerta. Jaak Panksepp, another wonderful scientist, puts in in the peri-aqueductal gray (PAG), which wraps around the tiny tube that feeds fluid into the brain and spinal cord, the aqueduct. The PAG is known to be important for mother-child attachment, and I think for oxytocin, the "trust" hormone. All really important stuff.

But still, I think in humans these factors all converge on the cortex. It's not either-or, because there so many evolutionary layers. Consciousness dates back at least to the early mammals (200 million years ago), and probably much more widely.

That means there are many layers in the brain that are involved. Again, the best and more direct evidence points to cortex as a "terminus" or "brain substrate" for consciousness --- so far.

In other animals, there is some evidence that deeper structures may provide conscious contents. I have not seen evidence for that in humans.

So there!

The trick is to keep your balance on the big flow of evidence, to stay openminded, but not so much that you can't tell where the evidence is pointing...

Best wishes,
Bernard

Bernard J Baars, PhD

<http://www.nsi.edu>

Baars & Gage (eds) Cognition, Brain & Consciousness: An Introduction to Cognitive Neuroscience. 2007. Elsevier, Academic Press. 2nd edition due in 2010.

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