

**A Unified Color Theory Based on the Eight Visible Planetary Bodies
Including the Earth, as They Evolved Through the Saturn, Sun,
Moon, and Earth Evolutions as Heat, Light, Chemical and Tone,
and Consciousness.**

by

Robert A. Selwa

Anthroposophist

University of Michigan, 84'

01/15/2018

Forward

In 2012 I came to a standstill in my art because I was lacking a strong understanding in the use of color. I read some works on color during my art schooling days, but none seemed very useful to me. As an Anthroposophist, even Rudolf Steiner's work in *Colour* wasn't much of a help. In fact, it was more confusing. My early schooling was steeped in hard science, so my mind was directed towards the thinking of Newton, and physics, regarding color. That wasn't very useful to an artist. Steiner's work was built upon the Goethean scientific approach. The problem for me seemed to then be in trying to reconcile the two approaches of Newton and Goethe. With a modern physics understanding, I felt this would have been a relatively simple or easy task just requiring a bit of research into the subject of color. I felt I could accomplish what I wanted in two years. It took five years instead. I eventually did it, but I had to start from scratch with the workings of Newton, Goethe, and even Steiner. Many findings in this paper also took much original thought, and thus extended my research time. Never did I think there was so much that was involved in understanding color. I found that color science could be a field of study on its own.

I found a trilogy of understanding necessary in this endeavor. One, you need a source of light and thus an understanding of the physics of light. Two, you need to understand the reflection of light off an object, which then requires an understanding of physics, and chemistry. Thirdly, you need to understand the anatomy and physiology and neuroscience of the human eye and brain to understand how EM radiation is transmitted to and becomes a part of our consciousness. Steiner's work was invaluable to me to piece all this information together to understand how we've evolved to this point in our consciousness to even ask and answer all these questions about our outer and inner environment regarding light and color. This understanding is necessary for an artist, as he or she must convey the message in their consciousness to their work of art, and then let that message resonate with the viewer.

I owe a debt of gratitude to Gretchen and Doug for helping guide me through this research. Gretchen wrote her master's thesis on color theory in graduate school, so she was able to help keep me on track having undergone this process herself. Her genius IQ shortened my probably never finishing this work - to just five years. I thank her for her patience. As for Doug, I would have quit early on by getting lost

in the physics of light. His Ph.D. in Physics from U of M was the source I had to rely on to answer my questions on the Physics of light. Thanks also to the members of the Lakeside Palette Club for their feedback on all my color experimentations with my art work. I learned, I applied what I learned, I learned what I applied, and then I took that experience back as a reference to learn again with a higher level of understanding through experience. I could easily write four times what I have so far, but this is just a start.

Thanks to Bonnie Hedges, Ph.D. who guided me with some other Anthroposophical books that were quite helpful and giving me some valuable insights into music theory. Unfortunately, Bonnie is no longer here in body to see the finished result.

Thanks also to Bob Thibodeau at the Mayflower for helping me find the relevant books by Steiner and others to ferret out the information I needed to overcome the many problems I came across in my research.

INTRODUCTION

For the artist, the understanding of light and the use of color, as well as the use of pigment to achieve a visual effect is essential. Artists apply their medium, and use color, in an intuitive fashion. That is the way of the artist. Color usage comes out of the subconscious mind as a pre-disposition based on a pre-conceived understanding of color itself. To gain a background in light and color there is the analytic and descriptive, or scientific materialistic physical approach of Newton, which is most conducive and useful to engineers. The philosophical/scientific approach of Wolfgang von Goethe is better suited for artists. Reconciling the two valid approaches requires knowledge of special relativity and quantum mechanics to understand the nature and origin of light in a descriptive and quantified way; a knowledge of chemistry and the atomic chemical structure of pigments; and an understanding of the neuro-biology of the human visual system for processing the electromagnetic radiation we receive through our eyes from the outside world. I also conclude and concur with the current thinking by physicists that there are no particles of solid matter, just conglomerations of forces whose relative densities make them appear “solid.” This is all necessary for the understanding of our visual field. Reconciling of the theories of Newton and Goethe also requires both a left-brain and right-brain approach for the understanding and usage of color. Through Newton's work in Optiks, he laid out the future path to show light and color as being the same, or that light is made up of color, and that color is light, and can be measured mathematically as wavelengths of electro-magnetic radiation. Newton also tried to link the colors to the scale of seven notes in music -- anticipating some connection or pattern between sound and vision. Goethe found different results than Newton when he performed his own light experiments. Goethe related that the two ends of the spectrum -- red and blue were due to light coming through darkness as red, and

darkness coming through light as blue. Goethe's approach, while also scientific, looked at light and color as being a part of nature, as opposed to the abstract mathematical phenomenon as seen through the eyes of Newton. Goethe was a poet, and his explanation of color was also poetic. Goethe paved the way for the philosopher Rudolf Steiner to correct, elaborate on, and extend Goethe's research into color theory. Steiner added a spiritual element to the theory of colors and grouped colors into two groups - - image and luster colors. Personally, I found that the experience of color is dependent upon one - a light source; two, the chemical structure of the surface that is reflecting the light back; and three, the processing of the electro-magnetic radiation through the rods and cones of the eyes into the imaging areas of the brain - giving us the consciousness of images, and sentient sensations in the brain. This visual imaging phenomenon is known as the Cartesian theater after the inquiry into this field by the Renaissance philosopher Rene Descartes leading us into the Enlightenment.

Man is a unique and peculiar animal who looks upwards to the heavens for his origins and guidance, and this is what distinguishes him from other animals. This heavenly upward quest is probably what led humans to using an upright posture and separated us from the apes. And what do we find in the heavens? Warmth and light. During the day, this warmth and light originates from the Sun. At night, we receive reflected light from the Moon, and light from the stars. Man had to wonder about this phenomenon of light. Without warmth and light, vision and life are impossible. In the pitch-black interior of a cave, man is lost without light. Eventually, out of necessity, man cultivated fire as an artificial heat and light source to rival the Sun.

As man sensed the role of the Sun as the origin of life and its influence on crops, we began to revere the linked role of heat and light and attached a divine role to these phenomena as light was fundamental to life. These divine light figures

became the lore of the Gods and set out to help explain the world, and our role in it. Through time, these stories and our understandings have become more sophisticated and useful.

As for our present understanding, light makes up our etheric (or life) body. In this present epoch man has developed an inner consciousness of light through the Christ being becoming “the light of the world.” The rest of this paper will expound on how we reached and evolved to this present stage of consciousness and development, and just what this consciousness of light consists of, and signifies. This knowledge can then better serve the scientist, as well as the artist by providing a higher platform of understanding to work from.

II. RELIGION AND LIGHT

The concept of light in the earliest written records started in Ancient Egypt (also verbally in Ancient India). Light has always been related to a divinity. In Egypt, it was the sun-god Ra. In Greece, it was one of the Titan gods Hyperion (and Helios) which later was transferred over to the Olympian god Apollo. In early Rome Sol was a sun god, and the late Roman empire saw the rise of Sol Invictus as a major Roman god. The Old Testament starts out as God creating light on the first day (Genesis 1:3-5). In the New Testament, Jesus Christ states that he is “the light of the world” (John 8:12). Our early understanding of light in Egypt was a feeling of closeness to our original physical warmth condition and our participation in creation. In Ancient Egypt, this began as a heart consciousness. We then evolved to Greco-Roman times and the philosophical study of light became an intellectual exercise guided by their mythology. The writings of Plato, Aristotle, Pythagoras, Empedocles, and others are examples of the Greek thinkers on light. During our common era or AD, especially after 1413AD, this Anglo-Saxon Teutonic post-Atlantean age brought light into our

consciousness or spiritual soul through Christ, and is the beginning of an inner light, will, or spiritual experience. Through science and experiment, light has been studied and then pondered over using our thinking and consciousness of this phenomenon, and experience. This modern understanding and consciousness of light is a part of our present knowledge and experience of light. The guide on this journey was the inner “Christ” (as the new Sun-being). Rene Descartes (1596-1650 AD) was one of the first to describe this inner experience of the visual system, and this was later given the name of the “Cartesian theater.” (see page 2)

Light, throughout recorded history, has always been held to a position of reverence, wonder, majesty and awe. This wonder and amazement by man was the origin or basis for the human learning process, and was written about by Plato (*Theaetetus*, 155c) and Aristotle (*Metaphysics*, 982b). In ancient Hinduism, light represented the gods of heaven, while darkness portended the presence of demons. The Ancient Egyptians worshipped their Sun-god Ra as the source of life. The Ancient Greek philosophers speculated on the nature of light, color, and vision, and had their own mythological light gods. The Ancient Romans worshipped their Sun-Gods Sol, and then Sol Invictus during the latter part of the Roman Empire period. With the advent of Christianity, Jesus Christ became the new Sun-being - the light of the world. At present, on a worldly scientific biological level, we understand the sun to provide heat and light as the immediate source for the beginning of our food chain.

In the Old Testament story of Creation, God’s first act was to create light. In Genesis 1:3 God said, “Let there be light, and there was light. God saw how good the light was. God then separated the light from the darkness.” God then became part of this light, and manifested himself in Jesus of Nazareth as "the light of the world."

In the New Testament, there are many references to Christ, God and light. In 1 John 2:5 it says “God is Light. Now this is the message that we have heard from him and proclaim to you: God is light, and in him there is no darkness at all.” In Matthew 6:22 “The lamp of the body is the eye. If your eye is sound, your whole body will be filled with light; but if your eye is bad, your whole body will be in darkness.” In John 1; 6-10 “A man named John was sent from God. He came for testimony, to testify to the light, so that all might believe through him. He was not the light, but came to testify to the light. The true light, which enlightens everyone, was coming into the world.” Again, in John 9:5 “While I am in the world, I am the light of the world.”

We can see this progression of the Divine Light coming from God, or from a spiritual origin. Our right, or public eye is a Sun manifestation. Our left eye is our private eye and a manifestation of the Moon influences. Our eyes were created as a bio-chemical response, or reaction to the influences of these two celestial bodies and fashioned from the energy from light itself. This binary influence of life on Earth (such as the sexes, bodily symmetry, etc.) is from the Sun and Moon, and is even manifested in our DNA itself as dominant (Sun), and recessive (Moon) genes.

What we have developing here in history is a growing awareness and consciousness about our relationship and understanding to light as a physical, and spiritual phenomenon. In Egypt, there was a deep feeling associated with their connection to light, and the Sun - a sacred power responsible for life itself. As we move into the Greco-Roman period, we have more of a thinking, objective, approach to light. Plato felt that light coming from within, was projected outwards for vision. What Plato experienced was the inner electrical activity from our brain based nervous system enlivening the eyes and interacting, or sensing the photons coming into the eyes producing feelings and thoughts and a desire and a curiosity for an

understanding of these phenomenon. This inner feeling or relationship to light progressed further into our 5th Post-Atlantean historical epoch through the Christ Impulse. Christ felt this inner Sun and solar system dwelling inside as Yahweh, or Jehovah, for him to proclaim that he was “the light of the world” (as the new Sun god).

Presently, we also look for an inner understanding of light in our search for God - the Christ within. With our present scientific method, we analyze, experiment, and theorize about light to provide us with knowledge based on various descriptions, characteristics, and properties of light. What light “is” constantly evolves as our understanding of the nature of the physical and spiritual world and ourselves evolve. Light still has that spiritual and religious aspect (of the unknown).

Presently, through Einstein and his work on the photoelectric effect, we understand light to be an electromagnetic force that behaves as a particle and a wave. Light is a force with certain distinct wave properties which thus designates light as a separate “particle” in and of itself with the name “photon.” In line with Max Laue’s criticism of Einstein’s photo-electric effect and light quanta in light itself, as opposed to quanta absorption by material – exchanging energy with matter, I formulate that light travels through space as waves with specific energy signatures. Upon interaction with matter, the energy from light is absorbed into the atomic shell structure of the surface material and radiates back in quantum packets and wavelengths: as distinct colors. The atomic structure of the compounded matter that is illuminated determines what wavelengths of light will be emitted, and thus the reflected colors we see. (What we see is also a product of our neurological anatomy and physiology).

How does one reconcile the approaches of understanding light from the purely descriptive, physical, experimental, and intellectual approach of Newton with the spiritual imaginative approach of Goethe? There is a subjective understanding and feeling for color allowed in Goethe due to human anatomy and physiology that “colors” our experiences of the electromagnetic energy entering our eyes and is then processed in our brain. The outward projection of inner light by Plato was our clue to look for light in the exterior through the intellect to understand light. Plato’s projected vision was his searching for light. Through this knowledge of phenomenological properties, we come to understand the object. To truly know the object, this must be internalized as an experience. The modern approach is to gather information and data about the object (through science and experiment) for the understanding, and then to reflect on what that information means. Then we integrate this information with our inner being to give a meaningful expression to the subject. With Newton, light and color were tangible objects with specific properties. Light was quantitative and measurable and could be measured by mathematics and machines. For Goethe, light was qualitative and experiential – something to be experienced by the human and felt. The methodology was different between the two. Goethe emphasized the human feelings and consciousness regarding light and color, Newton emphasized the intellectual understanding. The debate now is not whether who was correct, but to combine and weigh the two approaches in a consciousness that not only senses and feels the colors but understands their origin and their effects and characteristics.

The nature of color and light has been researched and thought about by scientists and written about by philosophers since recorded history by the Egyptians, and even earlier by the Ancient Hindus. Our Western study usually starts from the Greek philosophers – Socrates (“...that color is not a property, but the result of

perception”), Plato (in the *Timaeus* – eyes which carry light were the first of the organs they [i.e. the gods] constructed and a fiery ray emanated from the eye and reflected back from the objects to create sight), Aristotle (who believed the essence of light is white light, and that colors are made up of a mixture of lightness and darkness) and Euclid (summarized fundamental knowledge of optics, such as reflection, diffusion and vision, into a book called “*Optics*”). Ibn Alhazen (a Muslim who wrote a seven-volume book on color and light around 1000AD to show that light was an exterior phenomenon, as opposed to Plato’s idea of inner projection). Alhazen’s work influenced modern western scientists and philosophers, and this inquiry continued. Names such as Bacon (the use of the scientific method and experiment driven information versus logic and argument), Newton (light is comprised of colored particles), Huygens (light is a wave), Young (proved the wave theory of light), Maxwell (predicted the existence of electromagnetic waves), Einstein (postulated light as a photon and also postulated the photoelectric effect), Goethe (wrote *Theory of Colors* and began to increasingly note the importance of the physiological aspect of colors), Neils Bohr (showed that atoms could only emit discrete amounts of energy), Max Planck (indicated that light might be “quantized”), Schopenhauer (wrote *On Vision and the Colors* and started from Aristotle's linear colour system and Goethe's three pairs of contrast colours), Otto Runge (developed the color sphere with the primary, secondary, and tertiary colors with the poles of white and black), Steiner (color as spiritual phenomenon and classified as luster and image colors), and others.

Egypt & Light

“I am the one who openeth his eyes, and there is light; When his eyes close, darkness falleth.” – the Egyptian god Ra, 1300BC.

Light always held a sacred place among the religions. Records from Ancient Egypt elucidate this fact. Records state that the “two eyes of Horus,” the Sun and the Moon looked down on the civilization of the Nile. The eye of the sun god Ra (see Fig. 21) was the most significant symbol in Egypt. His eye – the sun- was creative, his vision was life itself. It was said that mankind arose from the tears of his eye. The nature of light was clear to the Egyptians. The gaze of Ra was the light of day. The gaze of their God was light, and light was God seeing. The Ancient Egyptians felt the presence of their sun-god Ra as watching over them. They worshipped this Sun (Being) as the source of and sustainer in this life and the life to come. An Ancient Egyptian inscription on papyrus reads - "I am the one who openeth his eyes, and there is light; When his eyes close, darkness falleth." - the Egyptian god Ra, 1300 B.C. Light thus emanated from god.

Mythology in Egypt, Greece, and Rome developed and evolved, and the relationships of the gods was to depict how this life worked. Our sciences work in a similar way with new discoveries, new understandings, and new theories and explanations, or insights coming into being. The Egyptian myths tell a story on how they viewed life playing out. Christ made God closer by God becoming human (as opposed to man becoming God) and told his "story" or Gospel in parables to highlight life's relationships and our connection with our Creator, and with each other, using this inner light - the God of human consciousness. With this inner light of Christ, we can examine the world of creation - physically and spiritually.

The Sun god Ra in Egyptian mythology transmitted light and warmth and engendered feelings in the human soul. The Sun was related to the heart. This insight would be further developed by the Greeks, where their mythology sparked and developed human thinking. The light of the soul was now found in the brain, and

human thinking – a pure soul activity. Christ raised this light of the soul to a higher consciousness, awareness, and spiritual level.

The Egyptians credited Ra as the author of all works of science, religion, philosophy, and magic. The Greeks further declared him the inventor of astronomy, astrology, the science of numbers, mathematics, geometry, land surveying, medicine, botany, theology, civilized government, the alphabet, reading, writing, and oratory. They further claimed he was the true author of every work of every branch of knowledge, human and divine. The moon with its reflected light reflected the reality created by the Sun. The deadening effect of the moon created the sciences - the analyzing of living processes of the Sun - which became living studies themselves. The Sun represented life, the Moon - reflected knowledge. The heart is our Sun organ, the brain our Moon organ. On Earth, the Pharaohs were the representative of their gods, and were linked to the sun god Ra (Sun, life), while passing the balancing test of the underworld of Thoth (Moon, death). Passing this test, the Pharaoh became associated with continued life, those failing this test suffered death.

In Egypt, we find hieroglyphics and visual or pictorial mythological guides throughout their art about their understanding of the Universe, or their “theory of everything.” Their god Horus was associated with the Sun god Ra and told a tale about the processes and patterns of life. The "two eyes of Horus," were the Sun and the Moon. The Sun gave direct light, the moon reflected light. Life on the physical plane was dependent on these two influences. Light had a deep meaning and experience for the Egyptians. The warmth of the Sun was absorbed inwards and associated with the human heart, the world of feelings, and life in general. The Moon, a sense of approaching death, and a reflected life of light - an after image.

Ancient Greece & Light

As we progress to Ancient Greece, we find, most forcefully in Plato's writings, the feeling of the Greeks of an inner light, or quest, that expanded and projected outwards from their own eye and brain. They developed a theory of vision based in part, on that experience. Plato also believed that the eye was created from light itself (which Goethe and Steiner also echoed).

In Ancient Greece Pythagoras (c. 500 BCE), as did Plato in his emission theory, proposed that sight is caused by visual rays emanating from the eye and striking objects. Pythagoras assigned the musical notes to colors (possibly the precursor to Newton's notion of similar relationships). Empedocles (c. 450 BCE) seems to have developed a model of vision in which light was emitted both by objects and the eye. Epicurus (c. 300 BCE) believed that light is emitted by sources other than the eye and that vision is produced when light reflects off objects and enters the eye. Euclid (c. 300 BCE), in his *Optics*, presented a law of <https://www.britannica.com/science/reflection-physics> reflection and discussed the propagation of light rays in straight lines. Ptolemy (c. 100 CE) undertook one of the first quantitative studies of the refraction of light as it passes from one transparent medium to another, tabulating pairs of angles of incidence and transmission for combinations of several media. Here we have a rationalistic physical world examination of light using the intellect.

Hinduism & Light

In Hinduism, light represents the gods of heaven, while darkness portends the presence of demons. Light manifests in the body as bodily vigor (tejas), spiritual power (ojas), and reproductive power (retas). Light shines in the mind as purity (sattva). When the mind is pure with sattva, it reflects the objects accurately and leads to right discrimination, mental clarity, and brilliance. When the mind is free

from impurities, the original luster and light of the Self manifests in the mind and illuminates it like the sun that shines in the clear, bright sky. In the body the eyes represent the sun and the moon since they are filled with the light of Self. As the sense organs, they have limitations in perceiving truth. However, the Upanishads declare that between the two eyebrows there is the light of the Self, the third eye, which can see without seeing, and which can perceive beyond the mind and the senses -- the truths that are imperceptible to them. Per the Upanishads, light is life itself. (Steiner echoes and states the ether or life body being essentially composed of light.) The light of the Sun-god nourishes the worlds and beings.

Buddhism & Light

In Buddhist art, rainbow light is often shown emanating from Buddhas and Bodhisattvas. Buddhas are beings who have achieved enlightenment. They are often represented with halos of light and sometimes even with a flame above their heads. These symbolize the inner light from within the individual Buddhas. Bodhisattvas are individuals who have also achieved enlightenment but remain on earth to help others.

Buddha Sakyamuni, 550-77. Museum no. A.36-1950. This marble sculpture shows the historical Buddha, the Buddha Sakyamuni, with a halo or aureole. Originally this would have been brightly painted.

Many other faiths have the concept of inner light, but it may not be represented in a visual form. Both Sikhs and Quakers, for example, believe in the inner light of God and how this can make one behave or feel. There is no need for a physical representation. Some Christians believe that the spiritual light of God can be experienced through music and good deeds.

'The Lamps are different, but the light is the same: it comes from beyond . . .'

It seems that this quote by Rumi, the medieval poet and Islamic theologian, is true to many of the world religions, but in faiths such as Buddhism, the light comes from within the individual through enlightenment and not from another spiritual source.

Meditation and Buddhism

From the very beginnings meditation has formed an integral part of the Buddhist Eightfold Path to salvation (the Eightfold Path is a wheel, the Wheel of Law, with eight spokes and each one is there to remind the Buddha's followers of one part of the Path. Buddhists need to follow all these paths at the same time to reach enlightenment.) In this context it is forming 'Right Mindfulness' and 'Right Concentration' leading the practitioner beyond the normal human states of consciousness towards a direct perception of the Buddha state. In Tibetan Buddhism there are many different approaches to meditation which is practiced by devout laymen, as well as by various levels of monks and nuns. In several traditions the focus is on the visualization of deities that encapsulate spiritual qualities the practitioner wishes to develop within themselves. In others various means of concentrating the mind lead to the experience of inner light as a greater reality beyond the normal sense of self.

The Bodhisattva Guanyin, 1740-1800. Museum no. T.97-1966. The last dynasty of China was the Qing dynasty, which ruled from 1644 to 1911. The style of multi-armed image represented by this woven picture of Bodhisattva Guanyin conforms to one of the Qing dynasty schools of Buddhism with Tibetan affiliations.

Visualization is a powerful tool which can help develop positive states of mind and emotions. For example, if we are feeling tense and stressed then it can be very relaxing and calming to imagine that we are sitting on a beach, picturing beautiful white sand, the blue of the sea, gulls drifting overhead and listening to the sounds of waves lapping on the shore. Sports psychology has shown that athletes tend to be more successful if they visualize themselves achieving their goals before competing.

Modern psychology has shown that we can also visualize how we would like to be at some future time and picture ourselves as being successful, happy and fulfilled in our lives. The American psychologist and philosopher William James (1842 - 1910) wrote:

'There is a law in psychology that if you form a picture in your mind of what you would like to be, and you keep and hold that picture there for long enough, you will soon become exactly as you have been thinking'.

Tibetan Buddhism also has a tradition of visualization which is associated with certain qualities that meditators want to develop in themselves - for instance the qualities of energy, calmness, wisdom or compassion and many other variations of these - kindness or courage, for example. They visualize symbols associated with qualities - a flower symbolizing receptivity or a Buddha figure symbolizing wisdom.

Judaism & Light

Festivals of Light - Judaism

Judaism

Havdalah candlestick, made by Eli Gera. Museum no. M60&a-1981. This is a candlestick and part of a Havdalah set comprising of four items: a candlestick, a

spice box and a wine cup cover. The last three form a single interlocking piece when not in use.

In the first chapter of Genesis (1:3) in the Hebrew Bible, we are told:

'Then God commanded "Let there be light" - and light appeared. God was pleased with what he saw. Then he separated light from darkness to make Day and Night.'

Light is fundamental to Judaism as a sign of God's spirit and guiding force. On a Friday night, the mother or senior woman of the household lights two candles to welcome in the Sabbath, the day of rest. The light represents hope and joy. Traditionally, in some parts of Europe an oil lamp was lit and hung above the table where the Sabbath meal took place.

The Sabbath is concluded with a service known as Havdalah (separation), in which spices, wine and a twisted candle in a special candle holder are all used to invigorate the senses and take the believer through another week. The prayers said during this service show the distinction between the light and the dark and thank God for creating the light of fire.

Hanukkah

Hanukkah (Chanukah), or the festival of light, is probably the most well-known example of the symbol of light within Judaism. It celebrates the miracle of the light in a historical event that took place in 165 BC. Antiochus Epiphanes, ruler of the Seleucid empire that stretched from Anatolia to the Indus valley, had decreed that Jews should not be able to practice Judaism. He forced them to worship the Greek gods and ordered his soldiers to desecrate the temple in Jerusalem.

Hanukkah lamp, 1700-1825. Museum no. M.413-1956. This Polish lamp was designed either to be hung on a wall or to remain free standing. Its back-plate

represents a building and it is flanked on either side by lions, symbolizing the tribe of Judah. It has two candleholders for Sabbath lamps.

In 166 BC Judas Maccabeus, who was living in hiding in the hills, led a Jewish rebellion with a small army and overcame the forces of Antiochus. When the Jews came to the temple on 25 Kislev (November/December in the Hebrew calendar) 165 BC, they found that it had been desecrated and the temple light extinguished. After searching hard, they discovered a small, sealed container of oil (a cruise) and used it to re-light the temple menorah (the seven-branched candlestick). The oil was only enough for one day, but the miracle was that it lasted for eight days, giving the Jews enough time to obtain more.

Hanukkah has been celebrated ever since. It starts on 25 Kislev and on each of the eight nights a candle is lit, until on the last night a row of eight candles burns. This light represents the re-kindled Jewish spirit.

Hanukkah lamps vary from region to region and sometimes reflect prevailing artistic styles. Most of the Italian Hanukkah lamps in the V&A's collection were meant to be hung from a wall. They have eight rows of containers for oil and their back plates are usually decorated with classical and Renaissance imagery, such as centaurs, cornucopia and lions.

Islam and Light

Nūr (Arabic: النور) may refer to the "Light of God" or the "Muhammadan Light" in Islam. The word "nūr" means "light" in Arabic and has been passed on to many other languages. It is often used in the Quran, notably in a verse that states "God is the light of the heavens and the earth", which has been the subject of much discussion. Many classical commentators on the Quran considered that this should

be taken metaphorically, as in the sense that God illuminates the world with understanding, rather than literally. The Andalusian scholar Abu Bakr ibn al-Arabi categorized nūr into different levels of understanding from the most profound to the most mundane. Shias consider that nūr in the sense of inner, esoteric understanding is inherited through the Imams, who in turn communicate it to the people.

The Sufis consider that light was created first, then all other beings and things were created from it. There is controversy over the doctrine of An-Nūr al-Muḥammadī, or the Muhammadan Light, in which Muhammad is thought to have existed before creation. Sufis in medieval Bengal developed the concept into detailed narratives of the way in which the world came into being from nūr. The Nur movement in modern Turkey, evolved from Sufi concepts, emphasizes inner understanding and control.

The word nūr comes from the same root as the Hebrew aor, the primal light described in the Book of Genesis that was created at the beginning. [1] The word nūr, or its derivatives, occurs forty-nine times in the Quran. It is used about God, Muhammad, the Quran, the Book, the Torah, the moon and the faithful men and women. Al-nur is often used in combination with zulumat (darkness) in terms that describe movement from darkness into light, and from ignorance into faith. [2] The word nūr is also used in eight basic referential meanings: [3]

The religion of Islam

Faith

God's commandments and moral laws in the Torah and the Gospels

The light of day

The guiding light that God will give to the faithful on the Day of Resurrection

The commandments and injunctions of the Quran

Justice

The light of the moon

The mystical Surah 24 of the Quran contains the Ayat an-Nur, the Verse of Light (Q24:35), which reads, "God is the light of the heavens and the earth; the likeness of His light is as a niche wherein is a lamp (the lamp in a glass, the glass as it were a glittering star) kindled from a Blessed Tree, an olive that is neither of the East nor of the West whose oil well-nigh would shine, even if no fire touched it; light upon light; (God guides to His light whom he will.)"[4] The phrase "light upon light" (nurun 'ala nur) in this sura is often used among Muslims to denote the infinite beauty, guidance and light of God.[2]

Most classical commentators other than Sufis took the statement "God is the light of the heavens and the earth" as a metaphor and considered that God should not be literally equated with the natural phenomenon of light. Al-Tabari (839–923) in his Jami al-bayan says that the best interpretation is to substitute "guide" for "light", as "God is the guide of the heavens and the earth". Other interpretations make God the source of illumination rather than the light itself, as "God lights the heavens and the earth. [5] The Persian scholar Al-Zamakhshari (c. 1074 –1144) says that the phrase "God is the light" is like saying "Zayd is generous and munificent". This does not mean that Zayd is the properties of generosity and munificence, but that he has these properties. Al-Zamakhshari rejected the possibility of attributes separate from God, such as power or knowledge or light, which would be contrary to the unity of

God. [5] He interpreted "God is the light of the heavens and the earth" as meaning, he is the possessor of the light of the heavens and the owner of the light of the heavens. The light of the heavens and the earth is the truth (al-ḥaqq), which can be compared to light in its manifestation and clarification, just as he says, "God is the friend of those who believe; He brings them forth from the shadows to the light (2:257), i.e., from the false to the true (al-ḥaqq). [5]

Al-Ghazali (c. 1058–1111) wrote a treatise on how different types of light should be defined, and how the phrase "God is the light of the heavens and the earth" should be interpreted. In his view, "light" can have three different meanings. The first is the ordinary usage, "an expression of what can be seen and through which other things can be seen, like the sun". In Arabic the word "light" may also refer to the eye, through which perception takes place, and this may be a more appropriate interpretation. [6] The "eye" of the intellect is an even more perfect organ of perception, and "light" may be used to refer to this organ. In this sense "light" may refer to Muhammad, and to a lesser extent to the other prophets and religious scholars. A third interpretation is that "light" is the first light (al-nūr al-awwal) and the real light (al-nūr al-ḥaqq) since it is the only light that does not take its luminosity from some other source. God is light, the only light, the universal light, and he is hidden from mortals because he is pure light, although he is omnipresent. Using the term "light" for any other purpose is metaphor. [7]

Another passage of the Quran states "The earth will shine with the light of its Lord" (Q39:69). Mainstream exegetes take this statement literally. Exegetes of the rationalist Mu'tazila school of theology of the 8th–10th centuries interpreted the word nūr in this passage in the sense of "the truth, the Quran and the proof" rather than the commonplace meaning of "light". [8] Shia exegetes take it to mean "the land of the soul will shine with the Lord's light of justice and truth during the time

of Imam al-Mahdi." Sufi exegetes take nūr in this case to mean "justice", or take the statement to mean "God will create a special light to shine on the Earth". [9]

Shia belief

The adherents of Shia Islam believe that divine guidance continues to reach mankind through the progeny of Muhammad. The Imams have the function of conveying the inner, esoteric understanding to mankind. According to Nadia Eboo Jamal, the Imams are "the inheritors of his spiritual knowledge (ilm), the bearers of the light (nūr) of God and His living proof (hujjah) on earth." [10]

According to the fifth Shiite Imam, Muhammad al-Baqir, the imams are the muḥaddathūn that are mentioned in the Quran and are the light of God (nūr Allāh). [11] He was asked to comment on the Quranic verse Q44:8, "And believe in Allah and His Messenger and the nūr (light) that We have brought down." He replied that the imams from the Prophet's family were in fact the light of God (nūr Allah) in the heavens and on earth. This spiritual light, passed down from one generation to the next, symbolizes the eternal knowledge that Muhammad passed on to Ali and his descendants. [12]

There seem to be two concepts. The nūr muḥammad is passed down through genealogical descent, while the nūr Allah is inherited at the time the previous possessor dies. The imam has the nūr muḥammad at birth but is silent until he receives the nūr Allah. [13] The nūr muḥammad is the symbol of succession and the substance that connects Adam to Muhammad and Muhammad to the imams. The nūr Allah is the symbol of prophecy, which the imams share with the prophets and all men chosen by God. [14]

Sufi interpretation

To the Sufis, *nūr* is the first creation of Allah, and all other things and beings were gradually created from it. [15] The Andalusian scholar Abu Bakr ibn al-Arabi (1076–1148) elaborated the concept that Muhammad existed before creation. This is the doctrine of *An-Nūr al-Muḥammadī*, or the Muhammadan Light. The light existed before creation, and everything was created from it. The world is a manifestation of the light, which was incarnated in Adam, the prophets and the *Aqṭāb*. [16] Ibn al-Arabi wrote, "The creation began with *nūr* Muhammad. The lord brought the *nūr* from his own heart." [17] The Persian poet and Sufi theoretician Fariduddin Attar (c. 1145–1221) wrote, "The origin of the soul is the absolute light, nothing else. That means it was the light of Muhammad, nothing else." [18]

The concept of the Muhammadan light was controversial, and the scholars al-Ghazali and Ibn Taymiyyah (1263–1328) rejected the idea that Muhammad was pre-existent. Instead they interpreted the primordial creation of Muhammad as meaning only that he was predestined. Later Sufis often used the less controversial term "Muhammadan reality" (*ḥaqīqa Muḥammadiyya*), particularly discussing the Light Verse. [19]

To the Sufis, light also represents what we know about our inner self, and darkness what we do not know. [20] Ibn Arabi distinguished three types of light: *Nūr al-anwâr* (The Light of lights), which reveals the absolute reality in its most transcendent aspect, *anwâr al-ma'âni* (The Light of the intellect) and *anwâr al-tabî'â* (The Light of nature). [21] The Kurdish philosopher Shahab al-Din Suhrawardi (1155–91) wrote, "Allah's essence is the original creative Light, always illuminating existence. It constantly manifests the universe and energizes it. Allah's Essential Light radiates the whole cosmos in abundant beauty and completeness. To be illuminated by this process means nothing less than salvation." [20]

Muhammad ibn Muṣṭafá Khādimī (c. 1702–1763) writes that, "protecting the spiritual heart from worldly thoughts can be accomplished by the spiritual heart's benefiting (receiving "Fayd" (nūr [light]) from the spiritual heart of the perfect Sufi master. The spiritual luminance (Fayd) flows from one spiritual heart to another by way of love. Death of the perfect spiritual guide or his being in a distant country does not stop the flow of spiritual luminance (Fayd)."[22] According to Inayat Khan (1882–1927) the soul is like a ray of the sun. The angels, who do not have physical bodies, are made of nūr, or light, that comes from the divine Sun, the Spirit of God. All souls are made of Nur, or contain some part of that essence, which is the essence of the whole manifestation. [23]

Medieval Bengal

Hans Harder writes that in medieval Bengali Sufi cosmology the nūr muḥammad is personified. The nūr, created by the lord, in turn brought the world into existence from drops of perspiration (gharma, ghām) that appeared in different parts of his body.[24] He says the concept is common in Majbhandari writings, often used to describe the saints or their sensual qualities.[24] Gholan Morshed wrote an article that identified nūr with Muhammad.[24] In his Is'lāmī prabandha sambhār he wrote that nūr-i muḥammadī is the moving force behind all creation, and should not be seen as separate from Muhammad.[25] He wrote,

At the background [antāral] of the creation, His [Muhammad's] nūr, the nūr-i muḥammadī, is at play [līlārta] as the life-breath of the creation. This is the highest secret of the play of creation, full of science [bijñān'may]. Therefore, Muhammad is not any special person, not confined to any specific country, race [jāti] or by any border. In the form of nūr-i muḥammadī, He is qualified [guṇānvita] by the same quality as Allah.[25]

Lutfunnesa Hosaini wrote a treatise *Tāohīd*, part of which discusses the creation of the world from the time when *nūr-i muḥammadī* emerged to the time when Muhammad was born. She writes that the *nūr-i muḥammadī* was divided into four parts. From the first three emerged the pen, the book of destinies and the throne. The fourth part was divided into four. From the first three emerged the angels that held the throne, the seat of the throne, and all the other angels. [24] The last part gave rise to the sky, the earth, heaven and hell, and to a part that then gave the light of the eyes of the believers, the light of their hearts, the light of the *tawḥīd* and the *kalima*. [24]

Lutfunnesa Hosaini gives another account with reference to a Quranic commentary named *Tafsīr-i rūḥ al-kitāb*. In this version *nūr-i muḥammadī* was also used to create the *nūr* of Adam, stored on his back. The angels gathered behind Adam to see the light. Adam asked the Lord to put the light on his forehead, and the angels came around to where he could see them. Adam wanted to see the light himself, and the Lord transferred it to his index finger. When Adam came down to earth, lights entered his back again, and the *nūr* was then passed from Adam through the backs of various men and the wombs of women down to the parents of Muhammad. [26]

Modern Turkey

Said Nursî founded the Nur movement in Turkey, stressing patience and spiritual withdrawal after the secularization program of the 1930s and 1940s had crushed revolt. [27] The adherents of the Nur movement and the Sufi orders in general consider that societal change will be enabled if individuals are redeemed. Negative feelings such as anger and shame should be controlled through inner mobilization. [28] Said Nursî's textually-based Nurcu movement evolved from the Sufi orders. According to the Nurcu leader Mehmet Kırkinci, "the sun of Islam set

down in 1925 and dawned in 1950 with the writings of Said, which enlighten the darkness of Kemalism with its light [nur]."[29]

References

^ Douglas-Klotz 2005, p. 255.

^ a b Fatani 2006, p. 467.

^ Fatani 2006, p. 468.

^ Irwin 2011, p. 27-28.

^ a b c Sands 2006, p. 110.

^ Sands 2006, p. 115.

^ Sands 2006, p. 116.

^ Abdul-Raof 2012, p. 36.

^ Abdul-Raof 2012, p. 148.

^ Alibhai 2002, p. 3.

^ Lalani 2000, p. 79.

^ Lalani 2000, p. 80.

^ Lalani 2000, p. 81.

^ Lalani 2000, p. 82.

^ Harder 2011, p. 72.

^ Trimmingham 1998, p. 161.

^ Dehlvi 2012, p. 54.

^ Dehlvi 2012, p. 53.

^ Sands 2006, p. 172.

^ a b Douglas-Klotz 2005, p. 253.

^ Yahya 1991, pp. 35–44.

^ Khādimī 2005, p. 7.

^ Khan 2013, p. 80.

^ a b c d e Harder 2011, p. 73.

^ a b Harder 2011, p. 75.

^ Harder 2011, p. 74.

^ Yavuz 2003, p. 33.

^ Yavuz 2003, p. 30.

^ Yavuz 2003, p. 57.

Sources Edit

Abdul-Raof, Hussein (2012). *Theological Approaches to Qur'anic Exegesis: A Practical Comparative-contrastive Analysis*. Routledge. ISBN 978-0-415-44958-8. Retrieved 2014-12-15.

Alibhai, Fayaz S. (2002). "Surviving the Mongols: Nizari Quhistani and the Continuity of Ismaili Tradition in Persia – A Reading Guide" (PDF). The Institute of Ismaili Studies. Retrieved 2014-12-15.

Dehlvi, Sadia (2012-09-05). *Sufism: Heart of Islam*. HarperCollins Publishers. ISBN 978-93-5029-448-2. Retrieved 2014-12-15.

Douglas-Klotz, Neil (2005). *The Sufi Book of Life: 99 Pathways of the Heart for the Modern Dervish*. Penguin Compass. ISBN 978-0-14-219635-9. Retrieved 2014-12-14.

Fatani, Afnan H. (2006). "NUR". *The Qur'an: An Encyclopedia*. Taylor & Francis. ISBN 978-0-415-32639-1. Retrieved 2014-12-15.

Harder, Hans (2011-03-08). *Sufism and Saint Veneration in Contemporary Bangladesh: The Maijbhandaris of Chittagong*. Routledge. ISBN 978-1-136-83189-8. Retrieved 2014-12-14.

Irwin, Robert (2011-04-14). *Memoirs of a Dervish: Sufis, Mystics and the Sixties*. Profile Books. ISBN 1-84765-404-5. Retrieved 2014-12-14.

Khādimī, Muḥammad (2005). *Ethics of Islam*. Hakikat Kitapevi. GGKEY:3HXN4S2CKUF. Retrieved 2014-12-15.

Khan, Hazrat Inayat (2013-07-02). *The Heart of Sufism: Essential Writings of Hazrat Inayat Khan*. Shambhala Publications. ISBN 978-0-8348-2874-2. Retrieved 2014-12-14.

Lalani, Arzina R. (2000). *Early Shi'i Thought: The Teachings of Imam Muhammad Al-Baqir*. I.B.Tauris. ISBN 978-1-86064-434-4. Retrieved 2014-12-15.

Sands, Kristin (2006-07-13). *Sufi Commentaries on the Qur'an in Classical Islam*. Routledge. ISBN 978-1-134-21144-9. Retrieved 2014-12-15.

Trimingham, J. Spencer (1998-05-19). *The Sufi Orders in Islam*. Oxford University Press, USA. ISBN 978-0-19-802823-9. Retrieved 2014-12-14.

Yahya, Osman (1991). "Theophanies and Lights in the Thought of Ibn 'Arabi". *Journal of the Muhyiddin Ibn 'Arabi Society*. 10. Retrieved 2014-12-14.

Yavuz, Hakan (2003-07-31). *Islamic Political Identity in Turkey*. Oxford University Press, USA. ISBN 978-0-19-534770-8. Retrieved 2014-12-14.

found at -- [https://en.m.wikipedia.org/wiki/N%C5%ABr_\(Islam\)](https://en.m.wikipedia.org/wiki/N%C5%ABr_(Islam))

Christianity & Light

God is light – What does that mean?

The phrase "God is light" appears in 1 John 1:5, where the apostle John is explaining that the message we have from Jesus Christ is that God is light and there is no darkness in Him at all. Light is the nature and character of God. He is not a light or a kind of light; He is light itself. All light comes from Him. At the beginning of time, He created the light to dispel the darkness and chaos that was over all the earth (Genesis 1:1–5). Then He created the lights in the sky, the sun, moon, and stars (Genesis 1:14–16). As light itself and the source of light, He had only to speak and light came into being.

Darkness represents everything that is anti-God: the wicked (Proverbs 2:13), judgment (Exodus 10:21), and death (Psalm 88:12). The light that is God is the opposite of the darkness that is evil. The light of God is His holiness, righteousness,

and goodness, which contrasts with the darkness of evil and sin. Light is part of the essence of God. He is completely, unreservedly, holy, with no sin, no taint of iniquity, and no hint of injustice.

Throughout the Old Testament light is regularly associated with God and His word (Psalm 119:105), with salvation (Isaiah 9:2), with goodness (Genesis 1:4), with truth (Psalm 43:3), with His commandments (Proverbs 6:23), and with life (Psalm 56:13). In Psalm 27:1 David declares God to be his light and salvation. God was the light that guided and led David through dark and difficult times of persecution. Darkness is the emblem of distress, trouble, perplexity, and sorrow. Light is the opposite of these. God furnished David with such light that he was filled with confidence and his fears were dispelled.

The New Testament picks up these themes, describing the holiness of God in different ways. God "dwells in unapproachable light" (1 Timothy 6:16); He is the "Father of lights" (James 1:17). John's statement "God is light" is a regular theme in his writings, especially as it relates to Jesus Christ. God's Light is revealed in Christ, whose light of love shines into lives darkened by sin (1 John 1:5–7). Jesus declares that He is the "light of the world" (John 8:12; 9:5). John describes Jesus, the incarnate Word, as coming into the world to be the "light of men" and "the true light which gives light to everyone" (John 1:1–9). Jesus came as the light of the world, breaking the power of the darkness of sin by His shed blood and death on the cross.

Jesus also describes His disciples as light and light-bearers (Matthew 5:14–16), encouraging believers to let their light so shine before the world that they see God in them and glorify Him. Paul picks up that theme, indicating to the believers in Asia Minor and Macedonia that their lives are a shining light of witness to the world around them (Ephesians 5:8). It is the privilege of all believers to pass on the

divine light they have received. Jesus told His disciples that the light they received in the dark, meaning His personal revelations to them through parables and obscure sayings, they would one day say in the light and shout from the housetops (Matthew 10:27). All who have entered the light of God through Christ have the responsibility to "shine as lights in the world" with the light of God himself to a "crooked and twisted generation" of people who live in darkness (Philippians 2:15). Because God is light, those who belong to Him must shine forth His light, becoming more like Christ every day. "For you are all children of light, children of the day. We are not of the night or of the darkness" (1 Thessalonians 5:5). God is light means that He creates spiritual light by which His children can see the truth. Without His illumination, we would walk in darkness as the world walks (2 Corinthians 2:14). To walk in the light means to know God, seek His wisdom, understand His truth, and live in the light of His righteousness.

III. PHILOSOPHY AND LIGHT

To trace the origin of light and our ability to detect it, we need to look at the different evolutions that our solar system has undergone, along with ourselves - as we have evolved out from it. Steiner describes this first state, or evolution, as the Saturn evolution, and that was a state of heat, or what physicists would now call plasma. It is during this initial state that our physical bodies were born. Our energy signature or internal temperature comes from or is due to this initial state that has been carried forward to the present. Our physical body was born from this state. The mineral world first had its origins in this Saturn evolution.

The next evolutionary cosmic stage that Steiner describes is called the Sun evolution. As the heat and energy from the Saturn evolution dissipated and the remains condensed, the planetary Sun was born that represented gas and light. Light

was thrown off as a by-product of heat emission as another form of energy. It was during this evolution that man acquired his etheric or life body. Our etheric body is essentially light. This teaching by Steiner is like the Hindu concept of light in the Upanishads. Plant existence was born or originated during this state and we can see how closely light and photosynthesis in plants became.

After the Sun evolution, Steiner describes the next stage as the Moon evolution. During the Moon evolution, the division of the sexes occurred. At this stage of our evolution the Earth and Moon were still one body - the Moon. The Moon evolution gave us what Steiner calls our astral body. During this further stage of condensation, the chemical or tone ether developed, and water. We had a water body at this stage. Our sense of hearing also developed at this stage. The animal stage developed out of this evolution.

Our present body came into existence during our fourth and present Earth evolution. It was at this stage that the human Ego was born, and our chance for individuality formed. The Earth and the Moon physically separated at this stage. The rest of the planets also formed during these evolutions. What developed during this further condensation from heat to material existence in this Earth evolution was our Consciousness Soul. This self-awareness is our Ego. The Christ being was the vehicle to cement this human consciousness through the event known as the Mystery of Golgotha. Christ became the light of the world as an inner light, or what St. Paul (Gal. 2:20) describes as "the Christ within me." The Christ event singled out man's role on this planet as we developed from the heat state of Saturn, to the light state of the Sun, to the chemical ether and tone state of the Moon, to the Consciousness state of the Earth. We are now becoming aware of our own being and our association with the rest of the solar system. The other planetary bodies influenced and guided our various bodily organs. Thus, our bodily processes are very interconnected with our

whole solar system and our body functions as a symphony of the solar system's influences -- with our limited free will. Indeed, this is a very small window to work within. Our body functions as a symphony of the Universe.

The planetary bodies are also connected to the spiritual hierarchies. The spiritual influences are the invisible forces that allow the visible to come into existence. The spiritual hierarchies are the Seraphim, Cherubim, Thrones, Dominions, Powers, Might, Archai, Archangels, and Angels. Next comes Man. Man, was made a little lower than the Angels. As these hierarchies pressed their spiritual influence on creation there was a physical compression along with a corresponding spontaneous spiritual reflex, response, and effect. In the case of the Christ event, the physical world was pressed upon by the angelic realm. Man, descended ever further into the physical, material world. The response in man was an internal spiritual understanding to lift man higher - back into the lost spiritual world, lest he languish and die in the physical world. That spiritual response was found in the new Sun Being – the Christ Being. "The light of the world" became the inner light found in the human etheric, or life body. Thus, the words of Christ of "I came to bring life, so you may have it more abundantly" (John 10:10) now is more sensical and gives us a deeper meaning, or understanding, to these words. This was the beginning of our Christ integrated consciousness regarding light as an inner, spiritual, force and experience, and thus an inner guide for the scientific approach to describe and understand light. As already mentioned, we have the materialistic approach of Newton, and the more spiritual approach of Goethe in our times regarding the understanding of light. Both these approaches are correct and probably due to Christ having both a divine and human nature (spiritual and physical). Newton appeals to our intellect and human, physical nature, and Goethe to our consciousness and Divine, or spiritual nature. Newton showed that color is light and tried to explain

how light behaves, along with its properties. This was a big advance over ancient Greek thinking. This the Greeks did not know this information, nor did they perform experiments as we now do; and this discovery about light was one of the reasons why Newton became so famous and exalted as a scientist. Goethe was more concerned about the aesthetics of light and "why" light behaved as it did. Newton focused on the "how" of light. My approach here is to create a bridge between the how and the why and take some of the mystery out of light and how and why we interpret light and color as we do, light's origin, and our inner experience of light.

My approach to color theory is based on experiment and direct experience, and an Anthroposophical Goethean approach to explaining scientific results in their context, and to avoid an overly broad encompassing theory. I posit that the human range of color perception is due to our being a part of, and born out of our solar system, and the range and numbers of different hues we visualize in our consciousness is equal to the number of seven visual planets (and now including the Earth for an eighth).

The existence of color perception is dependent upon three elements - one, a light source; two, a surface to reflect light; and three, a visual system to admit electro-magnetic radiation in, and then image it into a pictorial representation. That is done through color and value variations to produces outlines. My work on color theory extends that of Dr. Rudolf Steiner, Ph.D. (see Colours).

IV. SCIENTIFIC STUDY OF LIGHT

As previously stated, light has been studied for its religious and spiritual qualities. More recently, the properties and psychological effects of light have been studied scientifically. The most important names there have been Al-hazen, Newton, Goethe, Einstein, and Steiner. The behavior of light itself has been well documented,

but the understanding of "why" it behaves as such is still elusive. Therefore, the basis for the understanding of light is still held in religion. Religion forms our consciousness, understanding, and outlook.

As stated previously, light has been shown to be packaged in quanta. Newton showed through his prism experiments that white light is composed of different colors. Newton revealed that color is light. Color became defined as electromagnetic radiation with varying wavelengths and energy. The human visual range of colors of light range from red at approximately 350λ to violet at approximately 750λ . Above the red range is infra-red (heat). Below the violet range is ultra-violet. Within this visual range of wavelengths, you could seemingly find an infinite number of colors. That does not bode well for the artist in that picking colors is a deliberate, important, and intellectual process although intuitive in application. The artist does not have an infinite choice of colors at their disposal on their palette, and neither does nature. Light comes in quanta or packets of energy as photons. To narrow the amount of colors possible in our visual range, I made use of Planck's constant to find out how far space could be divided in that visual range. I found that if I subtracted the range of visible light (widest estimates given of) $750-350\text{nm} = 400\text{nm}$ and divided that by Planck's constant of 1.616×10^{-35} meters, we get the number 2.3515×10^{28} . That is the approximate number of possible color wavelengths that exist in nature between our visual range of wavelengths 750 nm for violet and 350nm for red. The number of colors the brain can detect is dependent on the number of rods and cones found in the eyes. There we can only detect approximately 10 million colors at the most. The number of colors that we can distinguish is around 1000 different colors. The physical capabilities of our eyes are 120 million rods and 6 million cones. The rods consist of disks with approx. 10 thousand molecules of rhodopsin. Each molecule absorbs a photon of light. There are about 1 thousand disks in each rod.

Each eye can then detect approx. 1.2×10^{15} photons – two eyes 2.4×10^{15} . There are approx. 6 million cones in each eye. How many opsin molecules in each cone is not clear. If we estimate each cone containing 1×10^6 opsin molecules we get 6×10^{12} opsin molecules – two eyes = 1.2×10^{13} . Multiply The two values for the number of combinations and you get approx. 2.88×10^{28} different variations of colors based on physiology. This is very close to the number of physical colors in our visual range. Could this then reinforce the contention that the eyes formed out of the light?

In the Islamic world with Alhazen, or Ibn al-Haytham (Latinized as Alhazen), in *Kitab al-manazir* (c. 1038; “Optics”), he correctly attributed vision to the passive reception of light rays reflected from objects rather than an active emanation of light rays from the eyes. He also studied the mathematical properties of the reflection of light from spherical and parabolic mirrors and drew detailed pictures of the optical components of the human eye. Ibn al-Haytham’s work was translated into Latin in the 13th century and was a motivating influence on the Franciscan friar and natural philosopher Roger Bacon. Bacon studied the propagation of light through simple lenses and is credited as one of the first to have described the use of lenses to correct vision. From there we go onto Newton, Goethe, Einstein, Steiner - along with a host of other scientists in between (Christiaan Huygens, Robert Hooke, James Clerk Maxwell, Thomas Young, Max Planck, Arthur Compton, Augustin-Jean Fresnel, Michael Faraday, Willebrord Snellius, Hippolyte Fizeau, Heinrich Rudolph Hertz, Arthur Holly Compton, and Louis-Victor de Broglie, etc... In Physics -- Newton’s approach with *Optiks* was taken further -- up to Einstein and his theory of special relativity (this competing with quantum mechanics). Goethe’s *Colour Theory* was carried forward to the present and corrected with Steiner’s Anthroposophical approach. Our Western theoretical understandings of light have also changed with

the evolution of our consciousness, and scientific discovery - like the way the mythological relationships of the Ancient gods had to evolve, grow, and change for them to develop a more mature understanding of life's happenings, and workings.

Physics of Light

For the artist, understanding color, even black and white, is essential - for line and form develops out of value, hue and chroma. The issue of color and form was settled by Delacroix - that form develops out of color and not vice versa, and this was put into use by the Impressionistic painters. The source of color begins with a light source, so the physical properties of light are first important to understand. As for the physics of light, light is conceived of as a form of energy without mass and as electro-magnetic radiation, behaving as both a particle and a wave. The light coming into our visual system as photons are an objective fact and are received into our physical body through our eyes. Our perception of colors is subjective (due to the unique neural structures each person has, and our interpretive Soul and social conditioning). Light quanta provide the original illumination energy to expose objects to our eyes through sight, by the reflected energy of objects, as photons expressed in quantum units. Different quanta and wavelengths stimulate different color sensitive neurons in the rods and cones of the eye. We experience conditions of light first with our physical body and then with our etheric body, and there the effects of light should be examined as the basis for color therapy.

As for Newtonian optics, we must resolve the remaining puzzles of light. One of these puzzles deals with the number of colors in the universe. Some say it is infinite. If for the color wavelength spectrum, we take as our visual range, using the range of colors from violet at roughly 380 nm to red at 760 nm, we can then approximate the number of colors in our visual range. Compare that to the ten million

different colors that the human brain can distinguish, and at first blush - it would appear to the uninformed person that there are an infinite number of colors possible. The number is indeed very large, but not infinite. That is significant for the artist, since he or she must paint with matter and energy as a Spiritual expression in both Time and Space. Time, matter, energy, space and Spirit are all important for the artist to express his or her consciousness in a meaningful way. This expanded understanding of color then translates into a higher and more integrated form of artistic expression, and a more informed visual experience.

TRILOGY ON LIGHT

Light source

One needs a source of illumination for light to exist. Light is categorized as electromagnetic radiation and behaves as both a particle and wave.

Through Arthur Holly Compton (in 1923), the packets, or bundles (or quantum) of light are now known as photons. The quantum theories of Planck, and then Einstein's work on the photo-electric effect allowed Compton to describe that light has this dual nature of electricity and magnetism depending on how it is tested. (Are we testing for properties, or their appearance?) We still do not know concretely what light is, but instead, we understand how it behaves under certain circumstances. Light still has this mysterious - and thus spiritual quality.

Pigment (reflection)

A second consideration beyond a light source in this pictorial system or “Cartesian theater” is the object and surface colors, or pigment. What do we see?

Newton found that color is light. So, the next question is what do we see when we look at an object? We see light reflected off an object. Without light, there is no color. Matter causes color as color causes light to act as color. Light itself is invisible or produces a sensation of white or luminance when red, green and blue wavelengths are present together. Light has no color. It is just electromagnetic radiation of varying wavelengths. The photo sensitive cones in our eyes produce the visual sensation of color.

The object and light source determines the colors we see. The pigment and atomic structure of the surface of objects determines what wavelengths of light are absorbed by the object, and which are then reflected. This surface structure is responsible for the phenomenon of luminescence, phosphorescence and florescence. Of the reflected wavelengths, those that reach the eye or other capturing agent (ex. a camera) produce an image. Light travels through space and time and illuminates matter as energy. Thus, the two eyes of Horus are still valid – the Sun as the source of emitting light, and the moon representing objects (in this case celestial) that reflect light. Light without a reflected surface just becomes the blackness of space. A surface without a source of light to illuminate and reflect a color back is also black. Color is impossible without either the two. These energy packets of light come in a variety of discreet quanta, the number of which is shown in my calculation using Planck's constant. These light packets then cause a corresponding physical response to their energy and form the organs of sight. In plants, this response is photosynthesis and flowering. In animals, the formation of eyes was this response to light. Light is electromagnetic radiation. To “see” objects, one needs an imaging device. Our eyes capture this radiation, and this photo-electric energy is then transmitted by transduction to our brain to produce visual images which enlightens our consciousness of our outer environment through pictures.

A. Neuro-biology of light and imaging

Our eyes sense and capture this electromagnetic radiation through the rods and cones in the rear of our eyes - or retinas, which then transmits these signals through the optic nerve to the imaging area of the brain. The rods are sensitive to lightness and darkness, while the cones are sensitive to wavelengths of red (680 nm), green (530 nm), and blue (430 nm). See Figures 15-17. This visual area brain activity is part of our pictorial and color consciousness, and the awareness of our environment - both external and internal. We even dream in pictures. Our complete human consciousness is a combination of all our various sensory experiences, our memory, and the interplay of our body with environmental experiences (spiritual phenomenon) that then become Soul forces directed by our will. Plato believed in the light emanation theory – that rays were projected from the eyes to see. What I believe Plato experienced was the electrical thinking activity of the brain extending to the eye to see, but he could not understand this activity well enough to explain it. Plato explained sight as protruding from this neurological activity. That was incorrect. Plato was looking for light. The interaction of internal electrical energy from our nervous system, along with incoming external energy into our visual system (for light - electro-magnetic radiation of a certain frequency) produces tensions and sensations which energizes and helps form our consciousness through experiences and pictures and contributes to our expanded awareness of our inner and outer environment.

The neurological basis of color perception proposes two theories -- the tri-chromatic theory, and the opposition theory. The tri-chromatic theory proposes that the eye has cones most sensitive to radiation corresponding to red, green and blue

light λ (Figs. 15). Humans are considered trichromats with these three different cone color sensitivities. There are animals that have four different cones and are called tetrachromats. Others have two cones - dichromats, and some who do not perceive color at all - monochromats.

The trichromatic theory links light with the receptive cones in the eye - particularly in the retina. Red, green and blue sensitive cones correspond to the red, green and blue additive qualities of light. Their combination producing the color white. Their absence, black.

As we travel behind the retina to the lateral geniculate nucleus, the three hues of red, green and blue are transformed from a trichromatic state to what is called the opponent process theory (See. Figs. 6&7).

White being the combination (sensation) of all three red, green and blue cones being stimulated by those wavelengths. Black being the absence of color - either reflected light (being all absorbed) or absence of a light source itself (empty space).

The Neurobiology of Sight

Understanding the neurobiology of the eye and brain is an important area of knowledge for the artist, since the perception of light and sensitivity to color by the artist, and understanding the nature of these sense perceptions, enables the artist to turn those emotional sensory stimuli into an intelligent artistic creation. Willfully reproducing a concept and image depends on the skill level of the artist. Everyone sees and interprets images and colors and content in slightly different ways based on their neurobiological and interior soul development, past experiences, and education. Thus, an artist's work is a very subjective endeavor. Skill and insight then helps

develop objectivity, a universal perspective, and thus a larger appeal for the artist's work.

One must remember, for the artist (and the observer of art, or life in general) the eyes are not an apparatus to see 'with', they are an organ that you see 'through'. A tool for the inner self. They are a lens to and from the outer world. Eyes evolved and formed as a response to light (as energy and stimuli working on matter). The right eye is dominant from the Sun influence, the left eye is recessive and a duplicate, or mirror image - from the withdrawing Moon influence (shades of the Egyptian god Horus). The Earth influence (or consciousness) is thought to be centered in the brain between the two physical eyes with the "third eye" or the pineal eye (also called the source or seat of the Soul in biology by Rene Descartes) which is linked to a light-sensing organ known as the parietal eye. We learn to see through our eyes with the guidance of the pineal gland and parietal eye. This name of "third eye" is probably due to the pineal gland being the only midline brain structure that is unpaired (azygous).

The eyes allow light as photons in the visible range of the color spectrum to enter, excite the rods and cones in the retinas, then transmit and register this input to the brain. The rods and cones are photoreceptor cells found in the retina that are capable of photo transduction. The rods and cones in the rear of the retina are stimulated by this electromagnetic radiation as light or color and this input is processed in the visual cortex of the brain. The rods (the most numerous, approx. 120M) are cells that mainly register light intensity. Even one photon will activate a rod. The cones (approx. 6M) are cells whose main function is to register color. There are three types of cone cells in the retina. Each one is most sensitive to a wavelength of light. That is, to red (L), green (M), and blue (S) wavelengths. These three types of cones are also called S (short), M (medium) and L (long). (See Fig. 16) In addition,

there are 2.4 – 3 million ganglion cells in the human visual system. One to two percent of these are photosensitive. The axons of the ganglion cells form the two optic nerves. Photoreceptive ganglion cells do not contribute to sight directly but are thought to support circadian rhythms and pupillary reflex. Light signals are transmitted by signal transduction. The entire process by which light initiates a sensory response is called “visual photo transduction.” The rods have an opsin chemical called rhodopsin that works with a pigment called retinal that is responsible for capturing the photon energy and begins this photo transduction process. The cones employ different types of opsins that combine with retinal to form pigments called photopsins.

Color is registered in the brain based on the number and types of cone cells stimulated. How this is perceived in the visual cortex is unique based on the individual's peculiar physiology. With this mix of rod and cone cells, ganglion cells, etc..., everyone perceives colors and objects slightly differently, and some people are more sensitive or deficient in different color tones, and variations of color.

Some colors that we perceive really do not exist outside the brain as a unique objective wavelength of light. Colors such as "white," "black," "purple," and “magenta.” The mixture and stimulation of the cones by red, green, and blue EM wavelength radiation give us the sensation of "white." Red exists at one extreme of the color spectrum (higher wavelengths than red introduce us into the "infra-red" range of heat which is not visible with our physiology), and violet exists at the lower extreme of the spectrum (lower wavelengths than violet bring us into the UV range - also not visible to most. Although some see "grey" in this range).

The number of rods and cones, their proportion, and the visual cortex determine the number of colors one can see (and probably the brain's imaging area).

Each rod and cone contain one opsin molecule, which when activated by light sends a signal transmitted by signal transduction to the optic nerve and then to the visual center of the brain. There, all the stimuli are collected to produce a sensation, or picture, of the outer world. Thus, the number of colors one can potentially see including tints (addition of white) and shades (the addition of black) are found in the color sphere (existing in space) (Fig. 11). While the number of colors available in the physical universe based on objective wavelengths are around 2.3515×10^{28} , the number of colors based on human anatomy (the single individual) are a few hundred million (based on the number of rods and cones in the eyes). Estimates on the number of colors the brain can distinguish are much less (2-3 million). The colors we use in ordinary activity are probably only in the hundreds, or thousands.

The psychological impact of the different colors is represented by color family (hue), then by their intensity or saturation (Chroma), and finally by their tonal value (value). With these tools, the artist can put the nature of color into perspective and into a workable context for manipulation.

Figs.14 illustrates how colorless light is comprised of different wavelengths of electromagnetic radiation and when reflected off an object and then coded by the rods and cones of the eye, we perceive a 'color' in the retina and visual cortex of the brain. Light (white) coming from a source such as the sun, a candle, or light from electricity, has heat initially related to it. The eyes allow light to enter and register in the brain through visual photo transduction in the "visible" range of the color spectrum. First, in the rods and cones in the rear of the eyeball or retina, and then through the optic nerve in the visual cortex of the brain. The rods (the most numerous, approx. 120M) are cells that mainly register light intensity. The cones (approx. 6M) are cells whose main function is to register color. However, the intensity of the light is also a factor. The cones are not as sensitive to light as are the rods. Some

electromagnetic radiation at a certain wavelength will produce a sensation of color similar to a close wavelength of light at a higher intensity.

COLOR WHEELS

Goethe – 6 colors

Newton – 7 colors

Etheric colors – 8 colors

Astral colors – 10 colors

Ego or Zodiac colors – 12 colors

Color Sphere

I have five color wheels here. The first is from Goethe with his six colors (See Fig. 1). Three primaries of magenta, yellow and cyan and three secondary colors of orange, green and violet. Although these were originally red, yellow and blue and orange, green and purple. Fig. 2 illustrates the seven colors of Newton. These are the six colors in Goethe's color wheel plus the color "indigo." Newton felt there should be seven colors to match the seven scales in music (shades of the thinking of Pythagoras). Newton's color wheel was unbalanced with seven colors. I balanced Indigo with its complement of the color peach (see Fig. 3) for what I call the eight "etheric" colors. Fig. 4 adds two more colors of purple and magenta to come to what I call the ten "astral" colors in the color wheel. Fig. 5 shows the complete or universal color wheel of twelve "Ego" or "Zodiac" colors - the three primaries (magenta, cyan, yellow), three secondary colors (orange, green, and violet) and six tertiary colors (red, peach, lime, turquoise, indigo, and purple).

Figs. 1 and Goethe's work can be thought of as the six colors of the physical world (say found in the rainbow). Fig. 3 can be thought of as the 8 colors of the etheric world (found in our imagination as living colors). Fig. 4 can be thought of as the 10 colors of the astral world (found in our solar system), and Fig. 5 as the twelve colors of the Zodiac, or Ego.

The seven colors of Newton are related to the seven visible planets - the harmony of the spheres which we also find in music. We seem to forget that the Earth is a planet too that exists in the heavens. That makes eight.

With God visiting the Earth in Christ, I added an eighth "Earth" color, and the color of peach, to balance Indigo as it's complement. Eight planets now balance with eight colors (see Fig. 3). Extending the planets to Uranus and Neptune which are not visible to the naked eye, I added two more "astral" colors in what I call the imaginary color range of Purple and Magenta (see Fig.4). Imaginary, in the sense that there is no objective or defining wavelengths to define these colors in the physical world. The complete color circle (Fig. 5) representing the Zodiac or Ego, comprises the colors Red, Orange, Peach, Yellow, Lime, Green, Turquoise, Cyan, Indigo, Violet, Purple, and Magenta.

In the trichromatic color theory scenario, we still have the present primary colors of magenta, cyan, and yellow (Fig. 6). In the opponent color system, I find red, turquoise, yellow, and violet (See Fig. 7). I also added white and black (tints and shades) into a color sphere to complete the work of Otto Runge's color sphere (see Fig. 11). Here we have all twelve colors found on my color wheel plus white and black, which when mixed, gives us all the possible tints and shades. This sphere represents our complete consciousness of color in space. The complete color circle

of twelve is most useful to the artist as all the complements are best balanced in this arrangement.

Goethe - "Physical" body colors

One may view the six colors of Goethe as physical colors - Magenta for the Sun, Yellow for the Earth, and Blue for the Moon (See the color triangle in Fig. 9). These are the primary subtractive pigment colors. Orange, green and purple are the mixed or secondary colors.

The red, green and blue cones in our eyes developed from these same three planetary bodies. Red from the Sun, Green from the Earth influence, and Blue from the Moon influence. The primary additive "light" colors are Red, Green and Blue. The secondary light colors are Magenta, Yellow, and Cyan. The primary light colors are the secondary pigment colors, and vice versa.

8 Etheric Colors

The eight "etheric" colors in my color wheel can be viewed as "Soul" colors and correspond to the eight visible planetary bodies in our solar system, including the Earth. These eight planetary bodies are our immediate connection to the solar system that we evolved out of and are conscious of and are reflected in our internal organ structure (see Steiner's Occult Physiology).

The color circle with the eight planets (including the Earth) encompasses Red-Sun, Orange-Mercury, Peach-Venus, Yellow-Earth, Green-Moon, Cyan-Mars, Indigo-Jupiter, and Violet-Saturn. Before the red wavelengths, we have the infra-red scale which is essentially black (the absence of color) to us since we cannot perceive these wavelengths. After the violet wavelengths, we have the ultra-violet range which is also essentially black since we cannot perceive those wavelengths either.

The planetary color wheel is as such (Fig. 3). Newton's indigo, I had to balance with the color Peach. Adding the Earth itself into the planetary mix, we now have eight corresponding distinct “etheric” colors.

10 Astral Colors

The ten “astral” colors include purple and magenta and match up with the ten planets in our solar system (see Figure 4). When we add the 'invisible to the naked eye' planets of Uranus and Neptune, we add the "imaginary" colors of purple and magenta. We now have 10 colors. The human mind invents the colors (or sensations) of purple and magenta. Purple is violet with a little red added. Magenta is purple or violet - with a bit more of red added.

Our consciousness of the color or visible range of EM wavelengths from red to violet is our expanded consciousness (from the Sun to Saturn) and define our physical ability to perceive these wavelengths due to our evolutionary connection with these planetary bodies. The "astral" view of ten colors is important as these ten colors relate to the ten planets (including the Earth) and the ten spiritual hierarchies (now including Man as the tenth hierarchy just below the Angels). The ten colors relating to the "astral" realm include the two planets Uranus and Neptune that are not visible to the naked eye, and thus are part of our spiritual imagination with the two sensory colors of purple and magenta. While we cannot physically see these planets with the naked eye, our evolutionary process experiences these planets, and those invisible planets are represented by these imaginary colors of Purple and Magenta.

12 Ego or Zodiac Colors

The complete 12-color Color Wheel of what I call Ego or Zodiac colors can be viewed as "Spirit" colors. This is our connection to the universe that we are intimately a part of, and is our living relationship of, and with the colors.

Our consciousness of color in the visible range of EM wavelengths from red to violet is our planetary consciousness from the unaided visual spread from the Sun to the planet Saturn and defines our physical ability to perceive these wavelengths due to our evolutionary connection with these planetary bodies. The "astral" view of ten colors is important as these ten colors relate to the ten planets (including the Earth) and the ten spiritual hierarchies (now including Man as the tenth hierarchy just below the Angels [see Fig.12]). The ten colors relating to the "astral" realm now include the two planets Uranus and Neptune that are not visible to the naked eye, and thus are part of our spiritual imagination with the two sensory imaginary colors of purple and magenta. While we cannot physically see these planets with the naked eye, our planetary cosmic evolutionary process experiences these planets in our imagination and those planets are represented by these imaginary colors of Purple and Magenta.

During the Earth evolution, our consciousness developed through our Ego development, and enabled us to develop or evolve as a distinct life form. Light, as photons, provides the impetus for outer phenomenon to enter our consciousness as sight or pictures by this energy stimulation as a photo-transductive event passing through our nerve cells and registering in our visual cortex.

Thus, we can explain the hues based on the eight planetary bodies. As the planetary bodies correspond, rule, govern, or influenced the evolution of our major organs, one can conceive of these eight hues as "etheric" colors as this symphony of colors play out in our physical and life-giving etheric body.

The colors based on the Zodiac are expanded to twelve colors and encompass the primary, secondary, and tertiary colors. The eight 'etheric' and ten "astral" colors are included in the 12 zodiac colors. The 12 Zodiac colors are the ten astral colors and now include lime and turquoise.

The color circle in Fig. 3 with the eight planetary bodies, have more of an etheric or immediate life nature as we are a part of the evolutionary process of the solar system and continue to be a part of, and influenced by it. The "astral" colors encompass our complete solar system (Fig. 4) including the eight planets, and the Sun and Moon. Included here are the planets we cannot see - Uranus and Neptune which give us the additional imaginary colors of purple and magenta. Fig. 5 is more complete and expansive, covering the primary, secondary, and tertiary colors and represent the colors of the Zodiac or Ego, and is thus more 'spiritual' or expansive in nature. Lime and turquoise are added here and balance out the primary and secondary colors with the tertiary colors and give us a complete array of all the complementary colors whose mixture produces gray). See the color mixes in Fig. 22.

Our psyche and bodily development, including our sense organs originated and are part of the cosmic mix or matrix that guided our evolution and set the limits and range of our sensory abilities (see Steiner, Colour pg. 50-51).

Color Sphere

When you factor in luminescence, or light and dark, you also deal with tints and shades. To illustrate this, the color sphere (see Fig. 11) is a most effective tool. Here, the full range of colors can be expressed in space with the various hues and colors expressing their highest Chroma, intensity, or saturation around the outer border of the center axis. The values of all the hues and color combinations are expressed as we move up from the center axis to the top of the color sphere (See Fig.

9) with white added for tints, as we increase the value of the colors. As we progress to the bottom of the color sphere, we add black to form shades and thus lower the color values. Greys or tones are found as you move to the center of the axis - either up or down.

The color sphere I developed (Fig. 11) evolved from the six hues of Goethe, to the seven hues of Newton, to the eight "etheric" and ten "astral" of mine, and finally to the twelve represented by the Zodiac or "Ego" and correspond to all the primary, secondary, and tertiary colors. While the twelve-color color-wheel that is made up of the primary, secondary, and tertiary colors is not new, the colors I advance in this pack of twelve are most accurate under this system. The concept of white and black, or light and dark are found above and below the color circle on the color sphere. My color sphere resembles that of Otto Runge but developed independently from his. Goethe was impressed by Runge's work. Unfortunately, Runge did not live long enough to finish work on this concept. The colors of the color circle stem from the cones of the eye. Light and dark in the rods. Together, they are responsible for our full conscious field of colors, including tints and shades.

VII. LIGHT AND THE SPIRITUAL HIERARCHIES

The eight planetary bodies visible to the naked eye limit the range of colors or wavelengths of the eight hues that the human eye can sense. We are sandwiched between these distances and influence from the Sun to the planet Saturn. The eight planetary bodies (in order) are the Sun, Mercury, Venus, the Earth, Moon, Mars, Jupiter, and Saturn. These are the planets visible to the naked eye. The acuity of the human eye has evolved to make these planets visible. Thus, we will limit ourselves to our human limitations and sensory range.

The eight planetary bodies correspond to the eight hues as such: Sun-red, Mercury-Orange, Venus-Peach, Earth-Yellow, Moon-Green, Mars-Cyan, Jupiter-Indigo, and Saturn-Violet. We are part of and born out of our solar system. So, these are the inherent limitations in our creation. At the heart and beginning of our Creation story is the Saturn evolution. Think of our solar system existing initially as heat, or plasma. We call this the Saturn evolution. From this heat plasma, our solar system arose. Springing and spiraling out from the center of the Milky Way galaxy the solar system was created. From this initial heat state of Saturn, the eventual planet Saturn separated from this mass of plasma. The other planets followed. Our Sun was the final remnant left of this original burning plasma. As the plasmas cooled, the present solar system took on its present form with its formed elements. The planetary solar system was then held together by centripetal forces.

After the Saturn evolution, the next distinct evolutionary phase was the Sun evolution. The planetary Sun now also exuded light as well as heat. Our eyes could now evolve and form. This light activity then supplied the energy for electrical or neural activity to take place in our bodies to create our brain and nervous system. Our eyes were created or guided in their evolution by the light from the Sun. Our visual system followed this evolutionary formation of the solar system out to the original planet Saturn - with our eyes being born and part of this event, and thus our ability to see the visible planets with the naked eye.

This heat condition of Saturn first formed our physical body. That past Saturn evolution heat signature precipitated out of the Earth with the human being evolving and building on the mineral, plant, and animal kingdoms. Our internal heat temperature is a lasting remnant effect of that heat condition of the Saturn evolution, and is our current connection with that past evolution.

Light and color also colored (and correspond to) our major organ systems -- as the planetary formations influenced and guided our various internal organs. Colors also correspond to our major organs and continues as part of their life pulse. Light therapy in medicine is based on this development.

Heat, or plasma, as it cooled, created the elemental planets. This original heat began through what is known as the Saturn evolution. The Sun evolution is characterized by light emissions. The eight visible planets including the Sun and Earth account for the eight hues that we recognize. The Moon evolution is responsible for the creation of the chemical/tone ether. Here we have a musical scale of eight. Do, re, mi, fa, so, la, ti, and back to do for its completion. As for the present Earth evolution and the development of consciousness, the human chakras, or energy centers I have also expanded to eight by adding a chakra for the feet for stability, or equilibrium. Through the Christ event, and His walking the Earth, this new chakra gives man top billing as a life form walking on this Earth and separates him from the animals. (See Fig.18).

During the condensation of heat in the Saturn evolution and the egg-like hatching of the planets, the groundwork was laid for the range of our vision in our consciousness. The basis for our physical body consisting of matter originated in the Saturn evolution. The Sun evolution opened our eyes to light. The celestial spheres of influence, or harmony of the spheres, that the planets once were thought to have by the ancient Greek philosophers is still correct. The spheres give us a bathing of color consciousness in a range that we recognize in the rainbow from violet to red-- as light is reflected off the water found in raindrops or is parsed out by a prism in Newton's famous experiments. The visible planets limit the range of our visual abilities through the frequencies and wavelengths we recognize to be a part of our

color vision. The range of electromagnetic radiation we can sense -- we recognize as light and colors. Light helps us to recognize time and place through motion.

The Moon evolution developed the chemical and tone ether. Groundwork for our sense of hearing originated here (along with the separation of the sexes). Thus, with light and sound, we comprehend, experience, or are aware of time (motion) and space (existence).

The spiritual hierarchies (see Figure 12) relate to the ten planets. Here I have the hierarchies mated directly with the planets. The top hierarchy (Seraphim) with the furthest planet Neptune and then down to the Sun and Man. One can now see why Jesus, or the Christ, is called the new light bearer. The ten 'astral' colors relate to the ten hierarchies and the ten planetary bodies. The hierarchies are the invisible spiritual forces responsible for the physical world to form into.

COLOR, TONE, CHAKRAS (energy centers) AND THE SOLAR SYSTEM

The seven principle and generally accepted chakras or energy centers in the human body (see Fig. 18 with color gradations) are 1) the head or crown chakra (red), 2) the third eye chakra (orange), 3) the throat (peach), 4) the heart chakra (yellow), 5) the solar plexus/navel chakra (green), 6) the sacral chakra (cyan), and 7) the root chakra at the base of the spine (indigo). I added an additional eighth chakra (violet) in the legs or feet that corresponds to the Christ walking the Earth and representing our will nature in movement and stability through the limbic system. Thus, we now have eight chakras. My diagram of the chakras and colors can be found in Figure 11 .

"Rudolf Steiner considered the chakra system to be dynamic and evolving. He suggested that this system has become different for modern people than it was in ancient times and that it will, in turn, be radically different in future times. Steiner described a sequence of development that begins with the upper chakras and moves down, rather than moving in the opposite direction. He gave suggestions on how to develop the chakras through disciplining thoughts, feelings, and will. (Wikipedia, How to Know Higher Worlds)." I continued Steiner's work in this direction in going down to the feet with the chakras. My colors and chakras are Crown-Red, Third-Eye - Orange, Throat-Peach, Heart-Yellow, Solar Plexus/Naval-Green, Sacral-Cyan, Root Chakra-Indigo, Foot or Leg Chakra-Violet. This extends the range of visible colors in the Newtonian spectrum from red to violet, and from head to toe. Above the crown chakra representing our connection to the spiritual world is magenta and white, while below, walking this physical Earth is purple and black.

As for the musical notes, I take the tonal scale do, re, mi, fa, so la, and ti back to do. Thus, we have eight again - from beginning to end. Physical Sun to planet Saturn. Do-Sun, Re-Mercury, Mi-Venus, Fa-Earth, So-Moon, La-Mars, Ti-Jupiter, and back to Do-Saturn (the beginning). Music originates, continues, combines, or adds on in our consciousness with various tonal combinations and varieties of form in an "imaginary" way much the same way as we have the experience of "imaginary" colors. Music that our brain invents, is sensitive to the harmony of the spheres.

The assignment of the colors I give to the planets and chakras is somewhat arbitrary at this point, and the logic is given to the sequence of the physical planets in their distance from the Sun. This may or may not be correct. More than likely it is, as this is the logical progression. Further research is needed here. The importance is the correlation between the number of planetary bodies, the number of hues, and the number of tones in our visual and tonal range.

PSYCHOLOGY OF COLOR

“Colors are evocative of moods and are thus useful to the artist to understand and manipulate colors for a certain effect. The “warm” colors correspond to the inner planets – sun, Mercury, Venus and Earth with the colors – red, orange, peach, and yellow. The “cool” colors correspond to the Moon, Mars, Jupiter, and Saturn in green, cyan, indigo, and violet. It is no wonder the inner planets represent the warm colors and the outer planets the cool colors as their distance from the Sun increases and cosmic warmth decreases.

There are two schools of thought regarding the psychology of color. One, that humans are hard-wired to respond to color, and two, that human response arises from learned color associations and are culturally acquired. Both have a truthful foundation. I hold that the hard-wired approach carries more weight. The cultural influences just “color” the physiological response. There may be a genetic predisposition in different peoples to experiencing different colors more vividly. This could be due to a genetic predisposition based on the distribution of the number of cone cell types (red, green, blue) and rods in the retinas. Thus, a genetically similar people would “see” things in the same light.

Color effects occur primarily through the three attributes of color in hue, tonal value (also called tone, value and even luminance), and saturation (also called chromaticity or chroma, and purity). The use of all these three attributes by the artist can draw attention to a desired section or scene in a piece of art or other visual signal.

Color categories are 1) Conventional color – the subjective perception implied in on color terms such as red, blue, yellow 2) Substance color – color in the form of pigments or dyes that may be derived from natural or synthetic sources such as

turquoise, indigo, lapis lazuli, and amber; 3) Formula color – proprietary colors devised by paint manufacturing companies, car companies, etc. which represent specific tints and shades of hues as defined by formula or mixture.; 4) Spectral profile color – color in the form of light waves. This category includes color in computer monitors, televisions, theater lighting, etc.

How color and light affect our bodily system, one can refer to the effects of light on circadian rhythms. The body responds to light qualities in different ways, and even maladies such as SAD (seasonal affective disorder) respond to different light frequencies and intensity as a therapy.

Newton asserted that light is “white” and the absence of “white” light is black. Light is not white. Light consisting of red, green, and blue wavelengths excite the red, green, and blue cones in our eyes to give us the experience of “white.” Black is the absence of light due to no reflection of light, or because of a void in space.

There are a variety of light sources including combustion lighting, incandescent lighting, LEDs, arc lamps, florescent tube lights, High density discharge (HID) lamps, all having a different distribution of light waves. That different distribution will affect the variety of reflected light waves.

Contrast and color contrast play important roles in visual perception by allowing us to detect visual segregation (shape), identify figure-ground boundaries, contours as well as depth. The parvocellular pathway in the brain, which distinguishes between varying levels of different hues thereby allowing for perception of shape and borders, has a slower processing time but higher acuity or resolution. The magnocellular pathway reduces visual data to tones of black, grey, and white, is sensitive to contrast (in terms of contrast between hues and luminance contrast) as well as movement, depth, or shape. A colored image on a colored background can be easily perceived by the parvocellular system, but difficult to perceive by the magnocellular system if the colors are of equal luminance. Because

of these different perception systems, contrast and color contrast allows us to identify contours, depth, and shape.

Other factors that influence the perception of color in an environmental setting include: Changes and variations in ambient lighting; changes in weather and season; viewing distance; variations in surface quality and texture; contextual perceptual effects such as induction and simultaneous contrast; and the references, expectations, etc. of the observer.

Color can be manipulated to make objects appear closer or appear to recede and in doing so, make the object appear marginally larger or smaller. While lighter, brighter hues automatically attract attention and may be deemed “important”, contextual colors always play a key role in determining what is perceived as being lighter and brighter relative to other aspects in a setting. However, it’s important to note that it is not just hue but often tonal value and saturation that contribute to these effects.

Tonal Chords have traditionally been used in art and design to convey acknowledging Various Tonal Chords have traditionally been used in art and design to convey connotative meaning and association and acknowledging this is important in any discussion about color psychology and color therapy.

A visual sensation can occur when the tonal value (or luminance) of a pair or group of colors is matched to a similar level and the lack of strong contrast makes the colors appear to vibrate. This tends to happen because we process and analyze color (hue) information and light-dark (luminance) information in separate parts of our visual system and our brain, and a pulsating effect may occur because of the parallel structure of our visual system.

If contrasting colors at the same tonal level are used, this tends to burden the rods and cones in the retina. This is because the rod receptors in the retina are sensitive to light-dark variations while the cone receptors are color-sensitive in opposing pairs of red-green and blue- yellow/orange. As the eye attempts to perceive each area of color, it has some trouble doing so due to the lack of light-dark contrast and this leads to an apparent quivering between the colors [33]. This effect along with ‘advancing’ and ‘receding’ color has often been used effectively in art and design.

Context is a critical factor in the perception of color and can have significant impact on how we perceive, understand and respond to an object or setting. However, color is always open to variation arising from surrounding color leading to variations in color perception. Various perceptual effects such as contextual simultaneous contrast can impact on color appearance. (O'Connor, Zena. **Colour Psychology and Colour Therapy (Kindle Locations 454-457). Design Research Associates; eBook Production and Publishing, Sydney. Kindle Edition.**) Simultaneous contrast for example occurs when a neighboring or surrounding color changes the apparent qualities of a color. This is useful to the artist or graphic designer to focus the viewers’ attention on an object of importance. Successive contrast occurs when the retina receives a lengthy impression of a color sample. Chevreul conducted numerous experiments to investigate this phenomenon and concluded that the hue perceived as an after-image was invariably the “complementary” contrasting color of the viewed sample color. Due to the impact of simultaneous contrast, artists and designers often find the need to adjust color to allow for perceptual effect. The study of color acknowledges all these perceptual qualities of color perception and how to manipulate these effects, but what occurs in processes both anatomically and physiologically in our neurological circuitry and visual system as a totality is still somewhat of a mystery.

There are many color illusions that have been identified by researchers and include the Craik-O'Brien illusion, the Bezold effect, the Koffka-Benussi Ring illusion, the Herman Grid illusion, and Mach bands.

Thus, there are many perceptual effects and illusions that can impact human perception of light and color. These effects and illusions are important to consider in discussions about color psychology and color therapy mainly because of the way they impact color perception and color application in practice. That is, the interface between color and human response is complex, and perceptual effects are just one of a range of factors that influence this complex interface. **(O'Connor, Zena. *Colour Psychology and Colour Therapy* (Kindle Locations 564-568). Design Research Associates; eBook Production and Publishing, Sydney. Kindle Edition.)**

While color symbolism is often assumed to occur on a universal basis, there are in fact few examples of color symbolism that transcend all boundaries in terms of individual differences as well as social and cultural variation. **(O'Connor, Zena. *Colour Psychology and Colour Therapy* (Kindle Locations 2728-2730). Design Research Associates; eBook Production and Publishing, Sydney. Kindle Edition.)** Colour symbolism also occurs on a social/cultural basis. That is, we acquire ideas and associations regarding colors through the social and cultural conditioning relevant to our life experience. Social and cultural conditioning that relates to beliefs and ideas tends to occur from the age of 3 or 4 onwards. These ideas and beliefs inform our thinking and guide our behavior [217]. Culturally-based color symbolism varies considerably and tends to emerge from diverse sources including folklore, customs, politics, rituals, superstitions, and so on. This diversity accounts for the highly variable examples of color meanings and color symbolism in different regions and countries [218-220]. It is important to note that the strength of an individual's belief system

has an influence on their affective, cognitive or behavioral response. That is, if an individual believes that blue is calming, they will probably feel calm when surrounded by blue. Or, if they believe that red is arousing, they will probably feel more passionate wearing red underwear or the like. Alternatively, if they feel that color has minimal impact, color will probably have little effect beyond novelty value, depending on the context. **O'Connor, Zena. Colour Psychology and Colour Therapy (Kindle Locations 2709-2718). Design Research Associates; eBook Production and Publishing, Sydney. Kindle Edition.** Similarly, people tend to differ in their sensitivity to environmental factors. High screeners can reduce the influence of environmental stimuli on their mood, behavior, arousal level, etc., and effectively screen out environmental stimuli. On the other hand, low screeners are less able to screen out environmental stimuli and more likely to respond [221-223]. It should be noted that connotative color associations and color preference are not fixed but are open to the influence of individual differences such as age and gender, affective state, education and preference [224]. Some color associations are particularly meaningful to an individual and these may have evolved within the lifetime of that individual for any number of personal reasons. In this way, individual differences have an impact on whether we identify and acknowledge examples of color symbolism, and whether we consider color associations to be a 'moveable feast' or fixed and inflexible. Hence, the strength of notions such as 'pink for girls and blue for boys' will vary considerably from individual to individual, depending on their belief systems, conditioning and so on. While color symbolism is often assumed to occur on a universal basis, there are in fact few examples of color symbolism that transcend all boundaries in terms of individual differences as well as social and cultural variation. **O'Connor, Zena. Colour Psychology and Colour Therapy (Kindle Locations 2718-2730). Design Research Associates; eBook Production and Publishing, Sydney. Kindle Edition.**

Early color-meaning studies A study that focused specifically on color associations by Wexner (1954) investigated the relationship between color and mood among 94 university students provided the following color associations ranked according to frequency. Exciting, stimulating - Red, yellow, orange Secure, comfortable - Blue, brown, green Distressed, disturbed, upset - Orange, black, purple Tender, Soothing - Blue, green, yellow Protective, defending - Red, brown, blue, black, purple Despondent, dejected, unhappy - Black, brown, purple, blue Calm, peaceful, serene - Blue, green, yellow Dignified, stately - Purple, black, blue Cheerful, jovial, joyful - Yellow, red, orange Defiant, contrary, hostile - Red, orange, black Powerful, strong, masterful - Black, red, purple [225].

Somewhat later, Murray and Deabler (1957) replicated Wexner's study to investigate whether color associations occurred across a range of different groups within a sample group of 202, which included university students, nursing staff and hospital patients. This study found that some color associations tend to be general, while other "associations are far from uniform from one person to the next" [226, p283]. The results listed below are not ranked according to frequency but by statistical significance. Exciting, stimulating - Red, yellow Secure, comfortable - Blue, green Distressed, disturbed, upset - Black, orange Tender, Soothing - Blue, green Protective, defending - Blue, red, green Despondent, dejected, unhappy - Black, blue Calm, peaceful, serene - Green, blue Dignified, stately - Purple, brown Cheerful, jovial, joyful - Yellow, green, red Defiant, contrary, hostile - Red, black, orange Powerful, strong, masterful - Black, red, brown, green. I prefer the ranking by statistical significance. **O'Connor, Zena. Colour Psychology and Colour Therapy (Kindle Locations 2744-2754). Design Research Associates; eBook Production and Publishing, Sydney. Kindle Edition.**

Whether such color associations are universal and strictly nomothetic is highly debatable and many believe that color-emotion associations are open to the

influence of many factors [11, 230, 231]. Colour preference studies have occasionally been cited in relation to theories about connotative color association. However, it is important to note that, while color preferences clearly link with positive aesthetic responses to color, this link does not represent correlation. Numerous color preference studies were conducted throughout the nineteenth and twentieth century's and these included small and large studies across a range of different cultural groups including English, American, Mexican, Filipino, Japanese Chinese and East Indians (details may be found at Pickford, 1972). However, the shortcomings of these included the small color sample range, the lack of control for hue, saturation and tonal value, and the inherent bias that assumed results could be generalized to the 4r population at large and other cultural groups. While color preference studies are interesting, they have little bearing on color symbolism [16, 232]. To summarize, the extent to which some individual holds color associations and assigns them any credence depends on their personal belief systems and the degree to which they abide by their own beliefs. In terms of color, the link between particular colors and various associations is a wholly artificial link; a construct of the mind. Humans are not "hard wired" in this respect and more recent evidence-based information suggests that one makes certain color associations, and these may or may not mediate certain responses [11]. As mentioned above, color symbolism and connotative color associations depend to a large extent on social and cultural conditioning and learning. **O'Connor, Zena. *Colour Psychology and Colour Therapy* (Kindle Locations 2808-2811). Design Research Associates; eBook Production and Publishing, Sydney. Kindle Edition.**

It is important to note that a definitive and universal link or interdependence between color and human affective, cognitive and behavioral response has not been established and while color may elicit connotative associations and meanings, these may not necessarily or invariably prompt cognitive, emotional or behavioral

responses. Caution is therefore advised in regard to claims found in mainstream media which imply a deterministic, universal and irrefutable link between color and any number of a range of psychological, biological or behavioral responses. For this reason, I do not set hard the color relationships that I find. Logically, the order of the planets would be linear as the wavelengths of light are. Orange always follows red and not blue, etc. For this commentary, color psychology is defined as the range of affective, cognitive and behavioral responses that may be allied to connotative color associations. Under this definition, responses are not considered to occur on a universal basis but instead linked to individual beliefs, and social and cultural conditioning. **O'Connor, Zena. Colour Psychology and Colour Therapy (Kindle Locations 3678-3679). Design Research Associates; eBook Production and Publishing, Sydney. Kindle Edition.**

The interface between color and human response is a complex interface open to a number of factors including individual differences; variations in cultural experience and the influence of these; as well as a range of contextual, perceptual and temporal factors. In this context, individual differences can include the impact of age, gender, personality, preferences, familiarity and association [10, 86, 230, 357]. **O'Connor, Zena. Colour Psychology and Colour Therapy (Kindle Locations 4092-4095). Design Research Associates; eBook Production and Publishing, Sydney. Kindle Edition.**

It is important to note that, while ancient belief systems have a valid place, they are not necessarily a guarantee of veracity as evidenced by superseded beliefs such as the world is flat, and the sun and moon orbit the earth. While no disrespect is intended, a proportion of the wisdom of the ancients has been supplanted by later scientific discovery. In short, the existence of a link with ancient wisdom should not of itself be used as evidential proof of any claim. **O'Connor, Zena. Colour Psychology**

and Colour Therapy (Kindle Location 4109-4112). Design Research Associates; eBook Production and Publishing, Sydney. Kindle Edition.

Correlation is not necessarily causation While correlation may indicate the existence of an association between one variable (such as color) and another variable (such as human response), a link may be purely coincidental. To attempt to suggest or argue the existence of a causal link without allowing for mediating variables and other influences is considered empirically and methodologically unsound [359, 360]. In addition, the presentation of statistics can be misleading, and it is easy for the under-informed to assume that connections between events are correlated when such a correlation is purely coincidental and not linked to causation in any way. **O'Connor, Zena. Colour Psychology and Colour Therapy (Kindle Locations 4124-4130). Design Research Associates; eBook Production and Publishing, Sydney. Kindle Edition.**

Conclusion - Theorists and practitioners of color psychology and color therapy believe that an irrefutable causal link exists between color and human response. They have, for the most part, determined their own logic and language “down to its very syntax and vocabulary...” in a similar fashion as sporting codes and avant-garde art [367, p35]. That is, literature and research that supports the ideologies of color psychology and color therapy are accepted and integrated into the ‘knowledge’ base; while literature and research that runs counter to the fundamental ideologies tends to be excluded. This blind adherence to accepted ideologies seems to exclude outliers or counter-instances. **O'Connor, Zena. Colour Psychology and Colour Therapy (Kindle Locations 4195-4201). Design Research Associates; eBook Production and Publishing, Sydney. Kindle Edition. “**

CONCLUSION

To bring this inquiry back home, what are the relationship between the musical notes, the planets, the colors, and the chakras? Basically, they are all unified

here with the eight visible planets including the Earth on which the Sun-being known as the Christ walked. While the reality is that Neptune and Uranus exist as planets beyond Saturn, their assimilation into our consciousness and understanding will come in later times as we move past the completion of our Ego development with our Consciousness Soul - into the higher spiritual realms (and cognitive dimensions) of imagination and inspiration.

The Christ is now the new Sun being. Through this inner light our consciousness helps expand our understanding. The artist can put aside the mystery, connection, origin, and our relationship to color, and deal with the psychological and spiritual attributes to freely develop form and content in art.

I posit that colors can then be divided into two categories – real and imaginary. The real colors are those with the highest Chroma and can be found in the range of the Newtonian color spectrum with definite wavelengths. The imaginary colors are those mixed in the human brain's visual and imaging system through the rods and cones and lateral gesticulate and have no corresponding home in the color spectrum (ex. purple, magenta, white, black). See figures 14 on the color spectrum.

So now we return to the phenomenon of light as being electromagnetic radiation in the physical world and existing as photons. In the soul world, we experience light in a range that is determined by the range of planets in our solar system. Our consciousness is formed by the spiritual forces existing in our solar system, the physical forces from the big bang, and our physical and spiritual evolution in this present Earth (evolution) period. Our will nature in this present epoch has pushed our consciousness to the ends of the color range of blue and violet. This is new. Even in classical Greece, these colors were not talked about. They were not understood. By Christ challenging Rome with the extension of our

Consciousness and unifying us internally with the visible planets out past Jupiter (indigo, the heavens, and the Roman high god) and back to our beginning with the Saturn evolution and the planet Saturn (violet and related to the Greek god (Chronos) of Time, and the Roman god Saturn) we can now better sense these colors with our expanded consciousness of the heavens. In our inner spiritual world or consciousness, our brain invents the colors between red and violet (such as Purple and Magenta), just as we invent "God" to explain the infinite as a type of closure for our thought processes. St. Anselm stated thus that "God is that which nothing higher can be thought". However, there is also an external reality and a "spiritual" world as "God is Spirit" (John 4:24). I related this phenomenon of "Spirit" to the ancient Greek notion of "aether" or "Quintessence" being the unity or an all-inclusive mixture of the four elements of air, fire, water, and earth (Empedocles 490-435 BC). However, I advanced and replaced the Greek word and notion of "quintessence" with "Spirit," and the elements with a higher knowledge or spiritual notion of Matter (earth), Energy (fire), Time (water), and Space (air). I further extended this relationship as a mathematical relationship with an algebraic equation, or "theory of everything" in $S' = (E \times T) / (M \times S) = 1$ (see my paper on Physics) where Spirit is an omnipresent combination of Matter, Energy, Space, and Time as a complete whole. The number one represents the oneness of the Universe. This expanded consciousness, spiritual awareness, and quest for wholeness or completeness, allows our perception of the "imaginary" colors expanding out to the planets of Uranus and Neptune (whose physical existence is confirmed using mechanical aids such as the telescope). Expanded further to our full consciousness of the Universe in the Zodiac - we have the twelve Ego colors with the primary, secondary, and tertiary colors. This understanding of the origin of color and light, and awareness of the twelve colors, is part of our being as our consciousness (as the fulfillment of our Ego consciousness). As we become more aware of the spiritual as a gradual evolution in our

consciousness, we move forward towards a fuller understanding of our identity as human beings. This new understanding of the origin, properties, and effects of color now lays bare the mysterious nature of color and light and allows the artist to better focus on effective uses of color, form and content.

Diagrams

Fig. 1

Goethe's Color Wheel – 6 “Physical” Colors

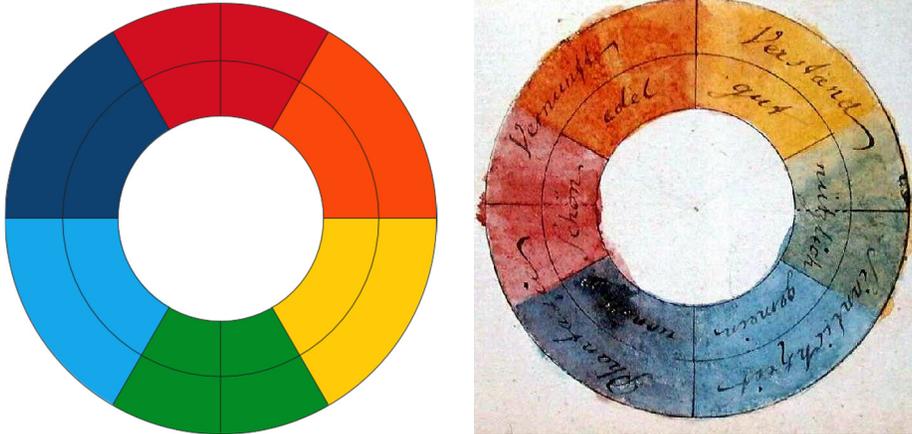


Fig. 2

Newton's Color Wheel – 7 “Planetary” Colors

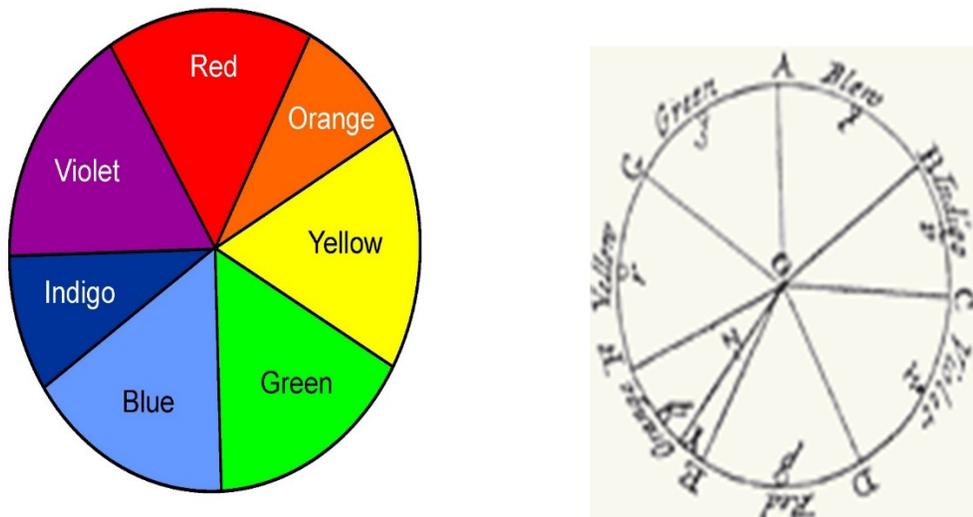


Fig. 3

Color Wheel – 8 “Ethereic” colors

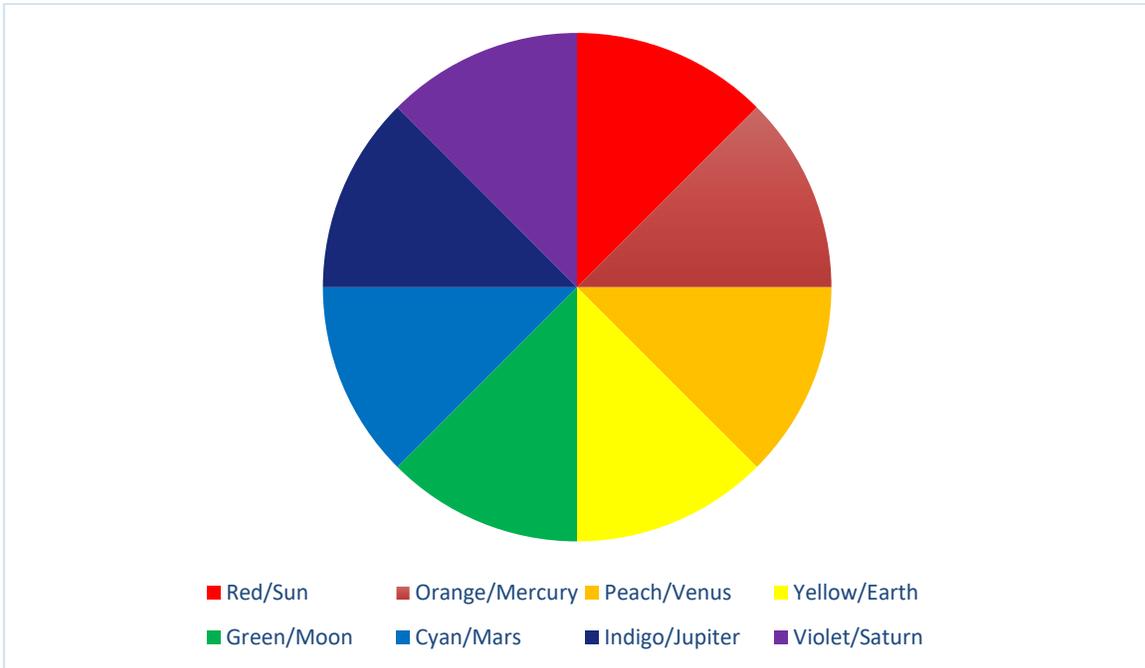


Fig. 4

Color Wheel - 10 "Astral" Colors

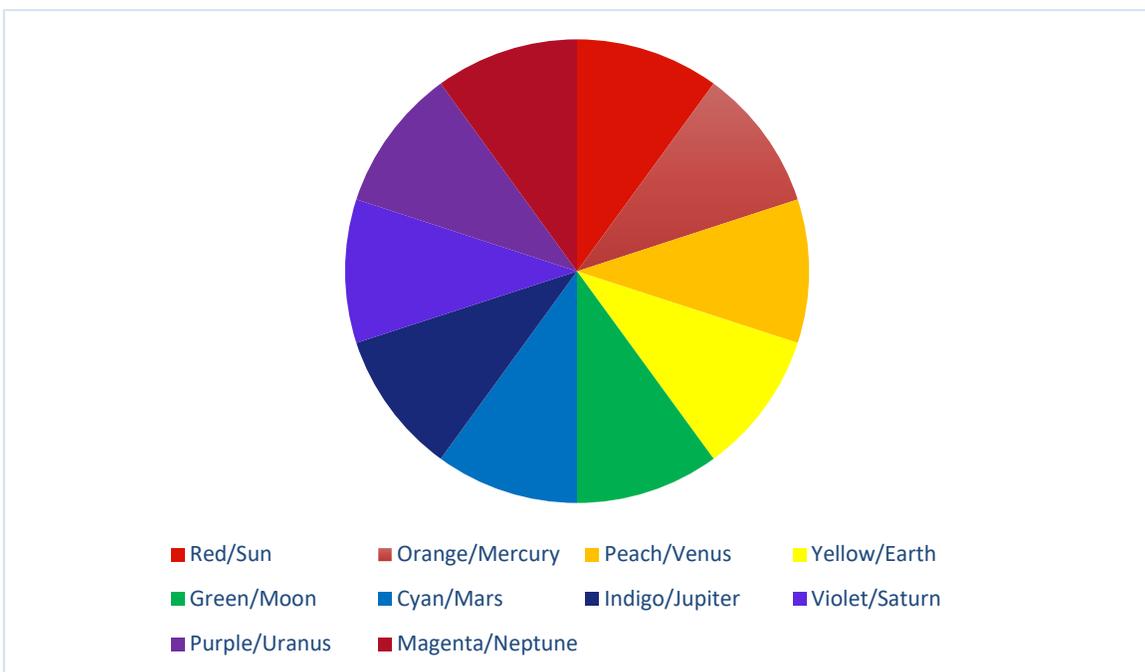


Fig. 5

Color Wheel – 12 Colors – Zodiac or “Ego” Colors



Fig. 6

Tri-Chromatic Colors – Cyan, Magenta, & Yellow



Fig. 7

Opponent Color Theory – Red, Yellow, Turquoise, Violet

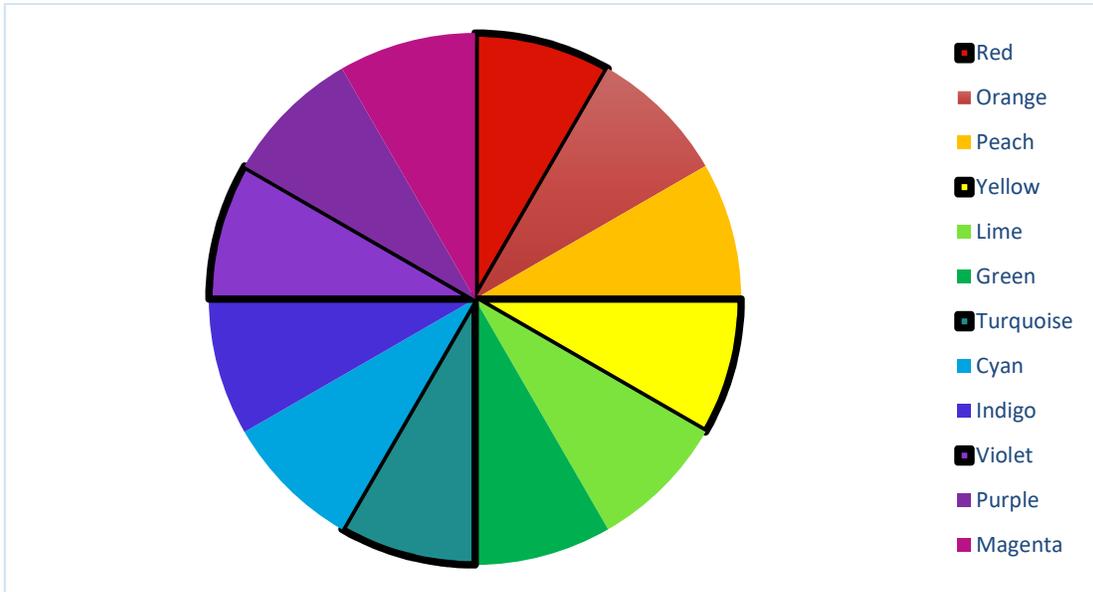


Figure 8
Opponent color theory
Linked to the Four evolutionary states

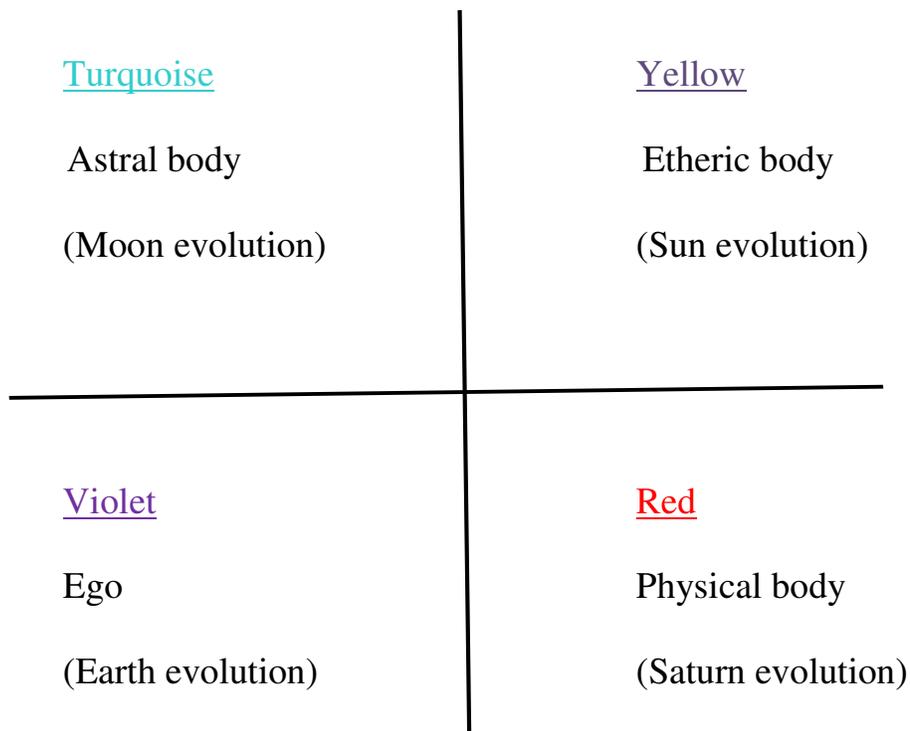
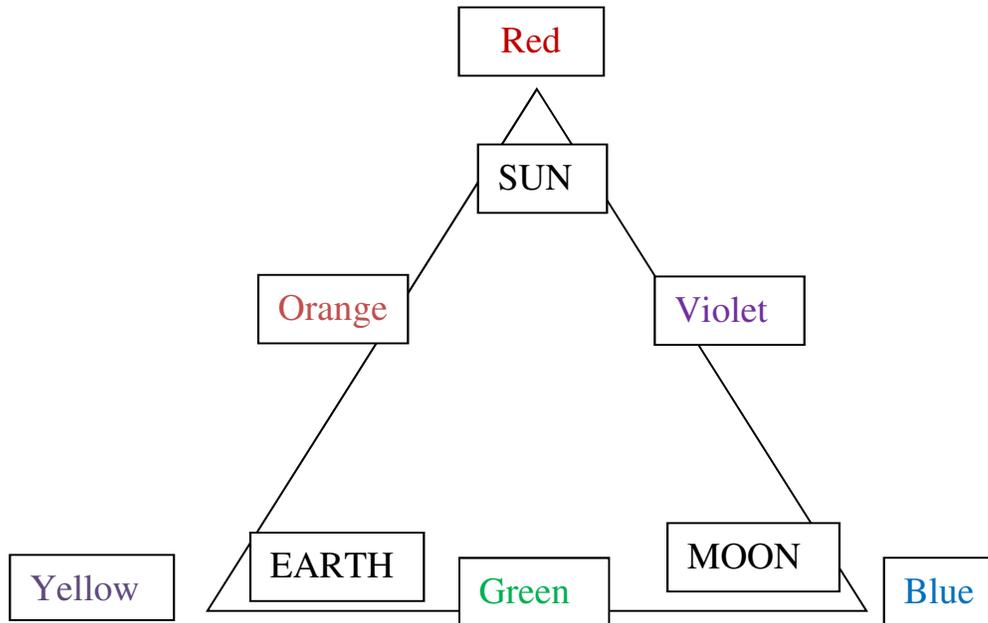


Fig. 9

Goethe's 6 "Physical" Colors

Red, Orange, Yellow, Green, Blue, Violet



Completed Color Sphere of Otto Runge with Black and White

Figure 10

Tone

Hue

H

α H

L

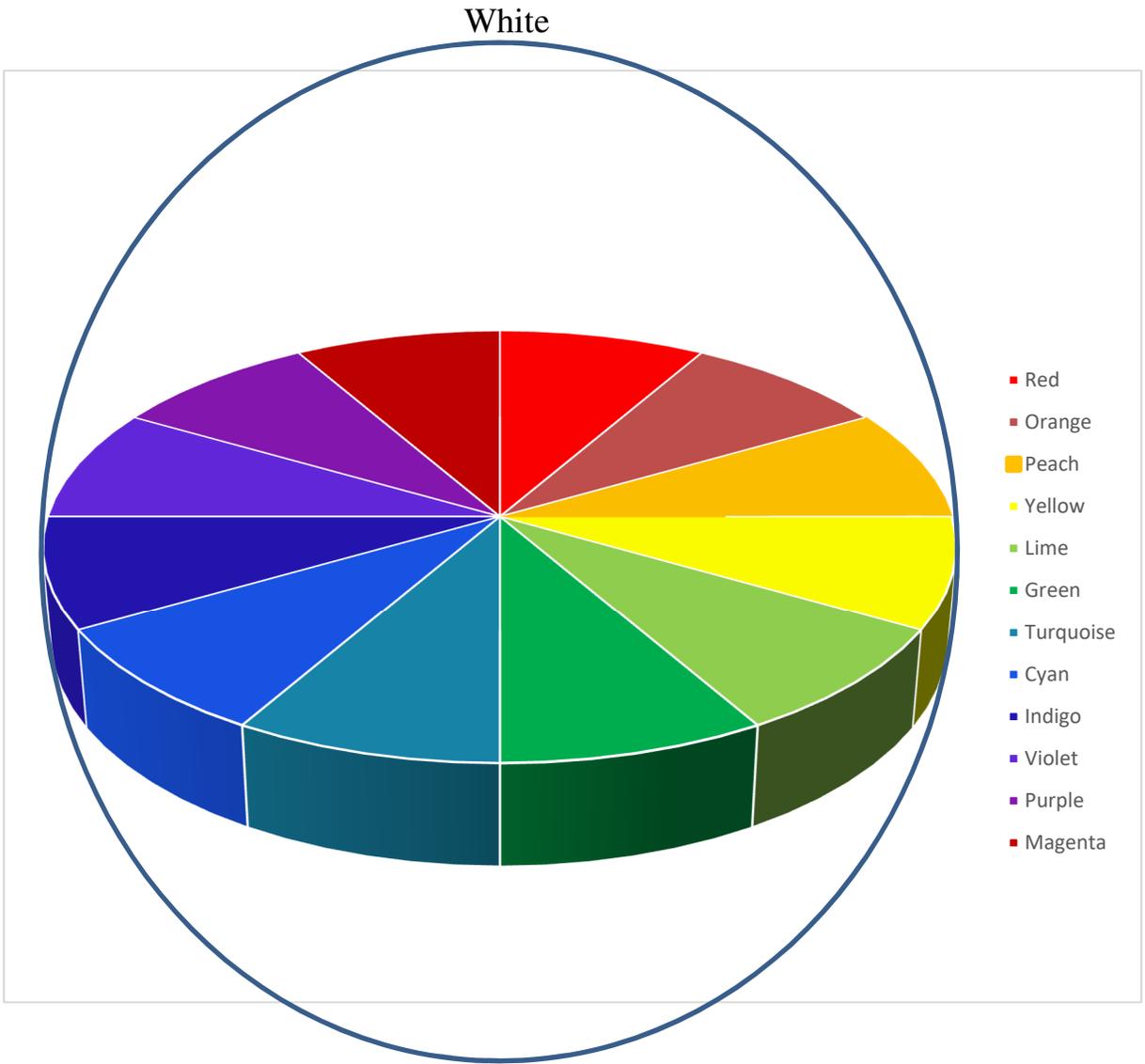
L

Saturation

L

H

Figure 11
Color Wheel
White (tints)



Black
Black (shades)

Fig. 12

The Spiritual Hierarchies and the Solar System

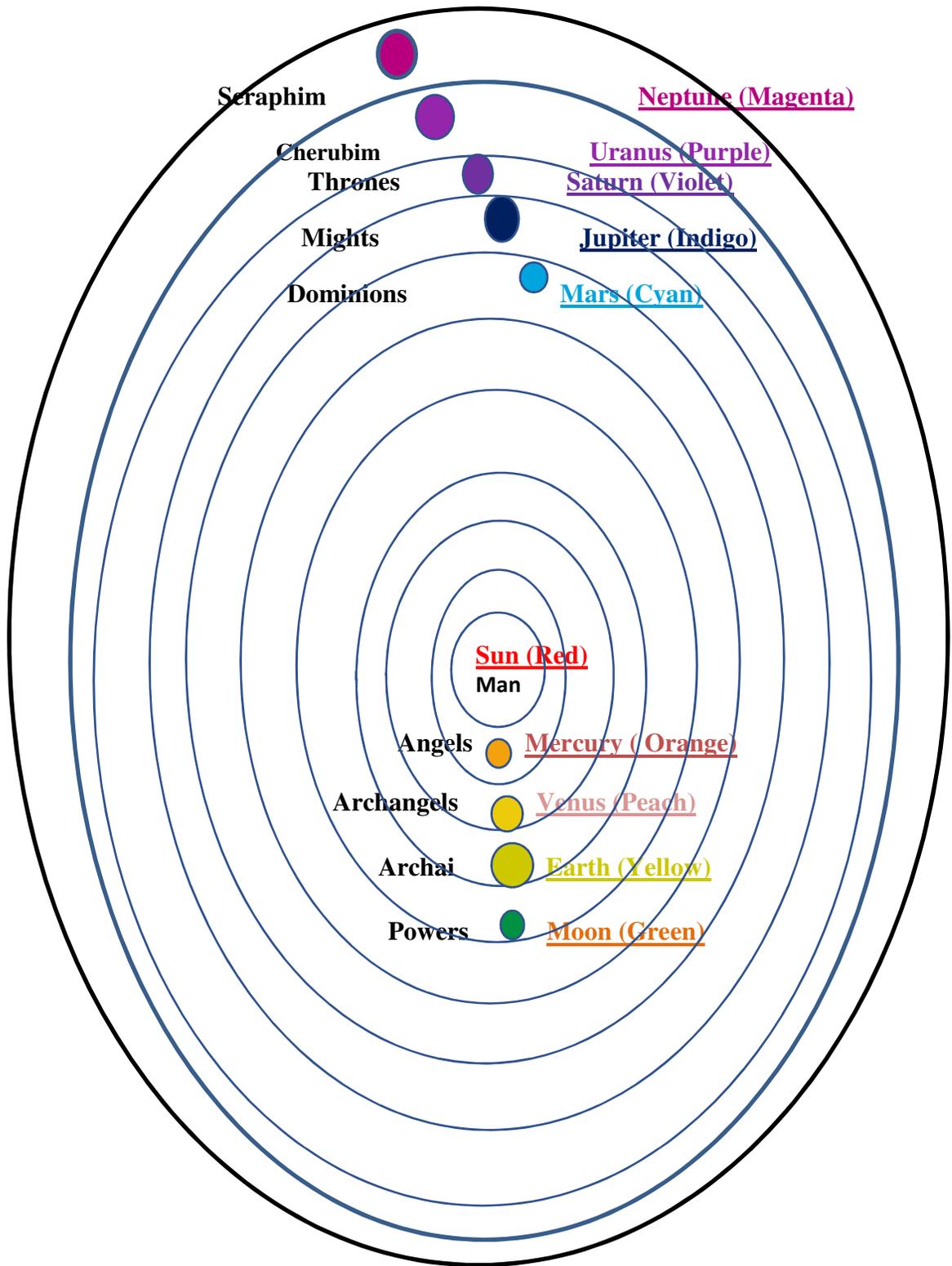


Figure 13

Star of David 6 x 2 [4 x 3] = 12 colors

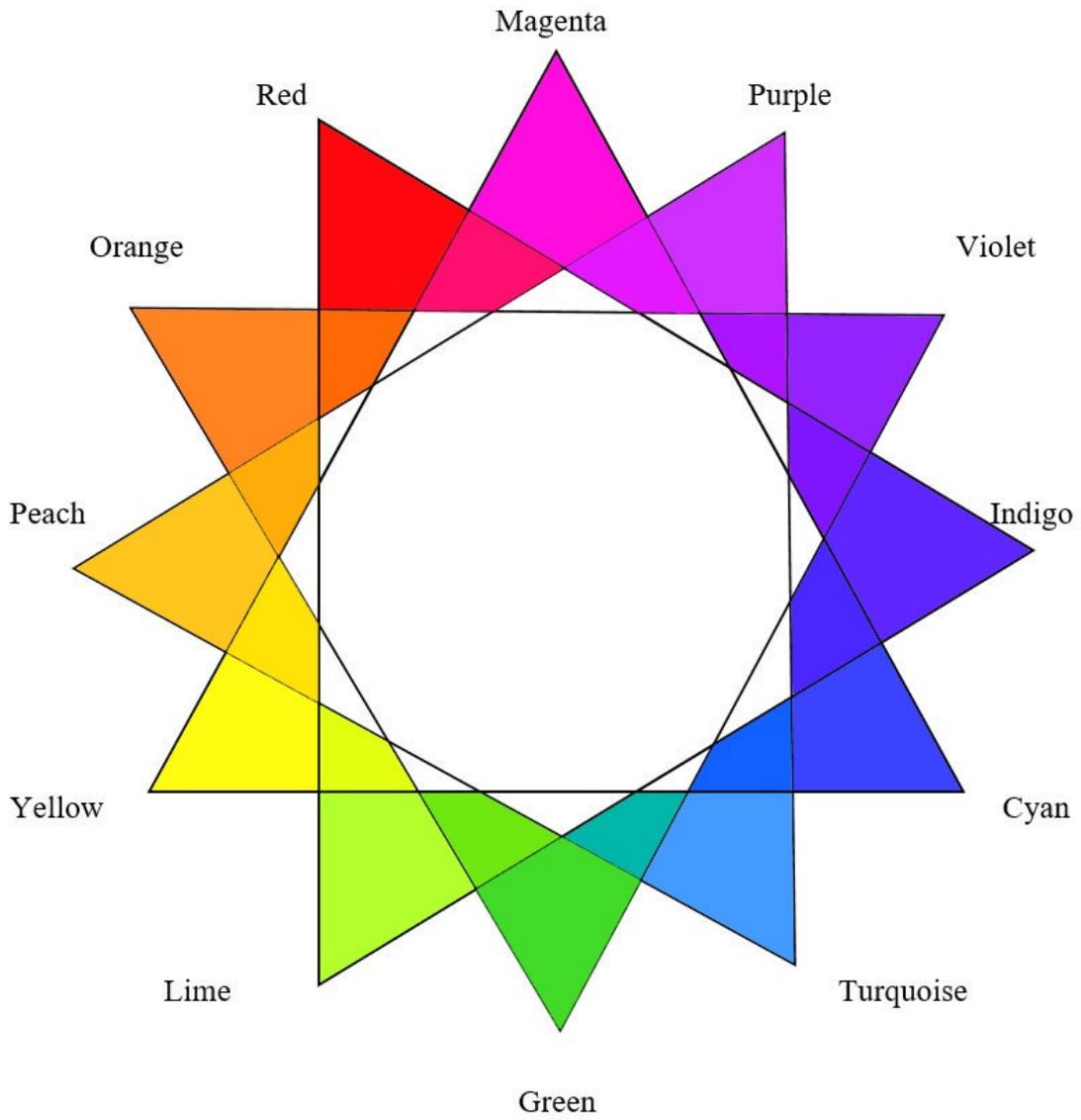
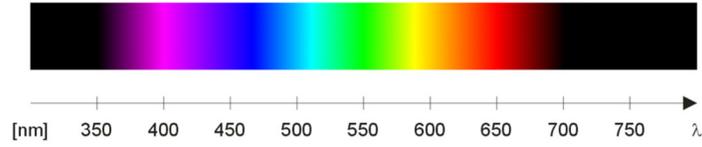
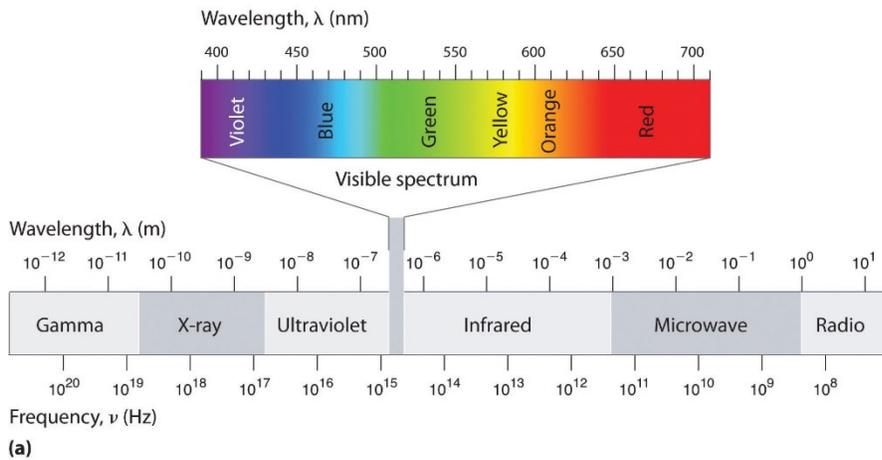


Figure 14a
Newtonian Color Spectrum



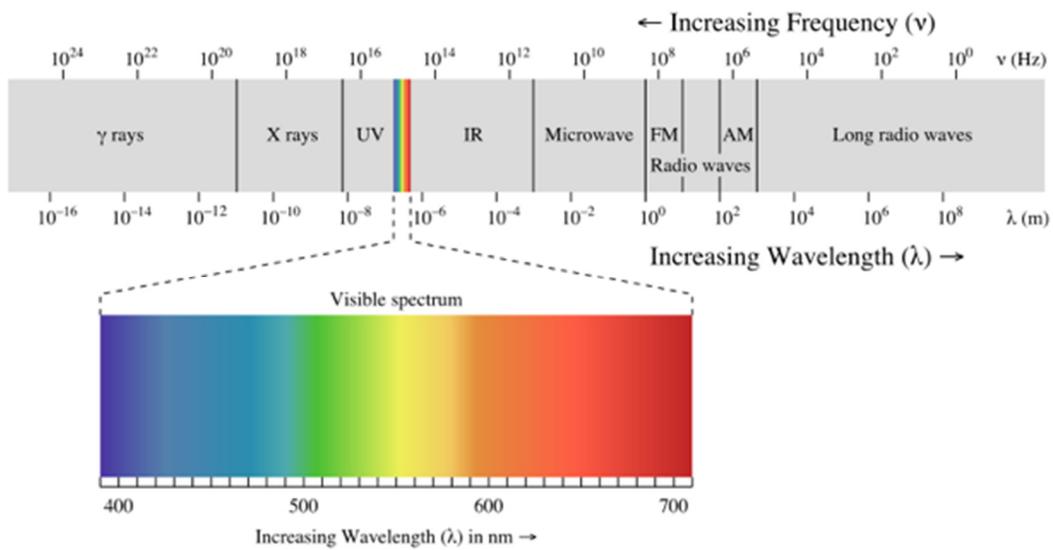
14b



14c

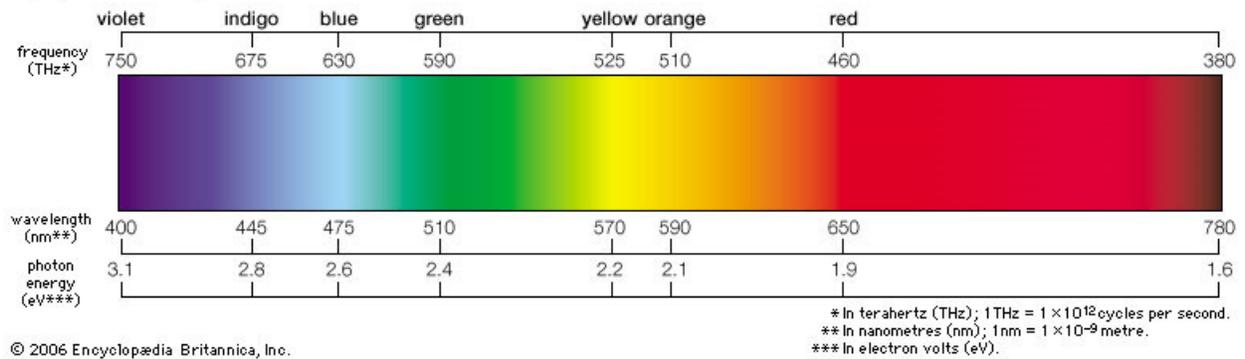


14d



Figures 14e

Light, the visible spectrum

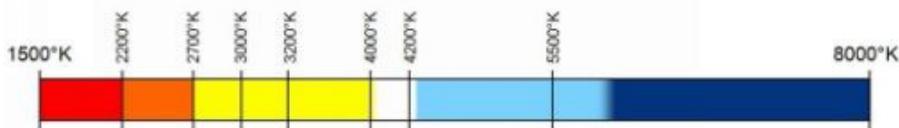


© 2006 Encyclopædia Britannica, Inc.

Fig 14f

Color	Wavelength	Frequency	Photon energy
violet	380–450 nm	668–789 THz	2.75–3.26 eV
blue	450–495 nm	606–668 THz	2.50–2.75 eV
green	495–570 nm	526–606 THz	2.17–2.50 eV
yellow	570–590 nm	508–526 THz	2.10–2.17 eV
orange	590–620 nm	484–508 THz	2.00–2.10 eV
red	620–750 nm	400–484 THz	1.65–2.00 eV

Fig. 14g



The Kelvin temperature scale.

Figure 15a
Cone wavelength sensitivity

Young-Helmholtz Color Theory Diagram

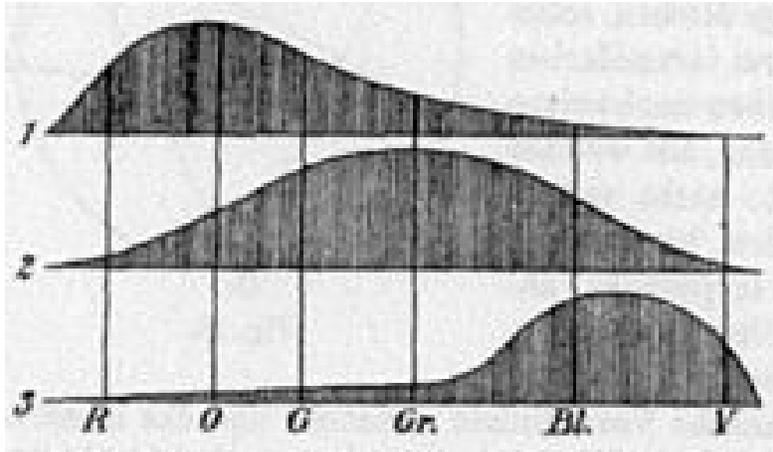


Figure 15b

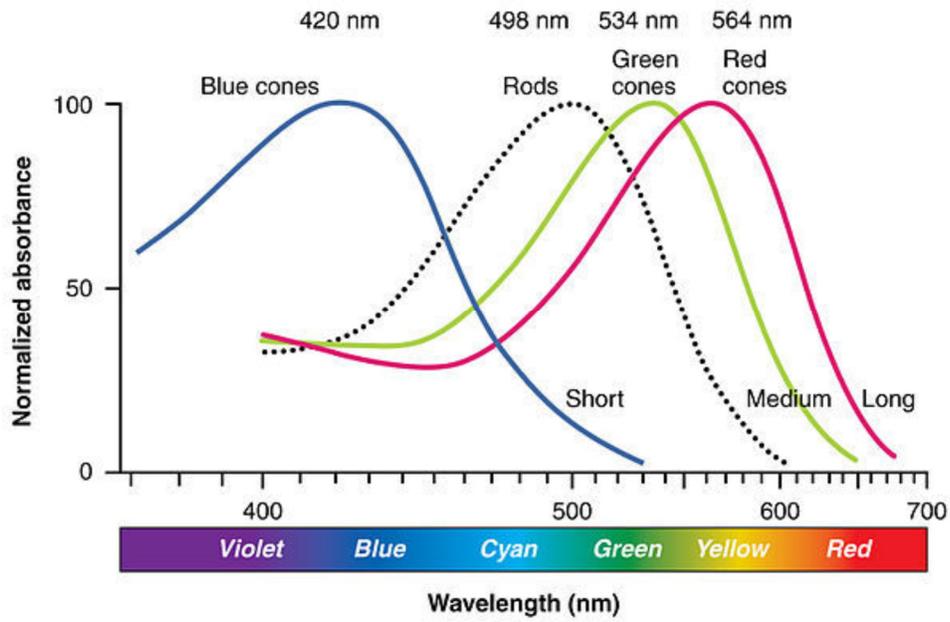


Figure 15c

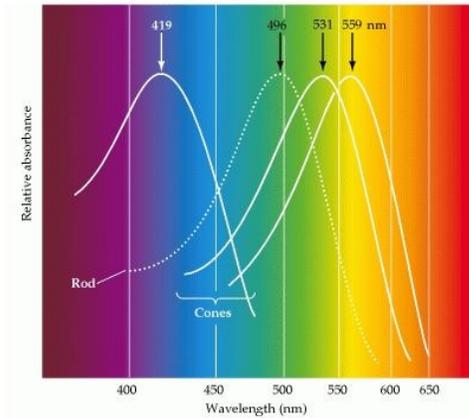


Figure 11.12

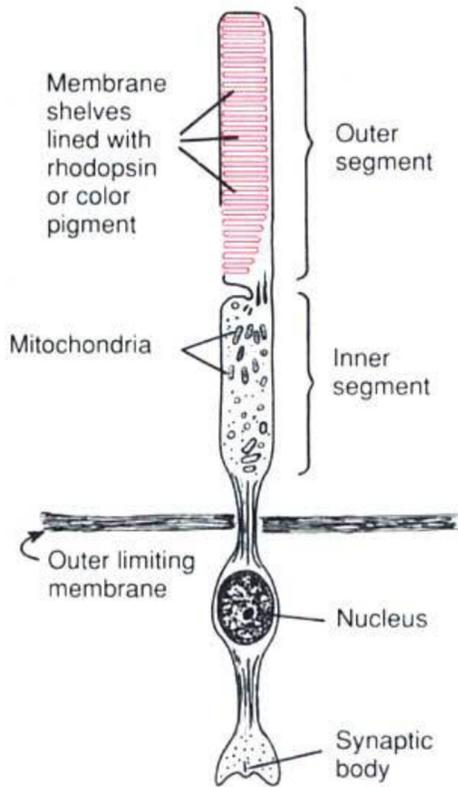
Color vision. The absorption spectra of the four photopigments in the normal human retina. The solid curves indicate the three kinds of cone opsins; the dashed curve shows rod rhodopsin for comparison. Absorbance is defined as the log value of the intensity of incident light divided by intensity of transmitted light.

From: [Cones and Color Vision](#)

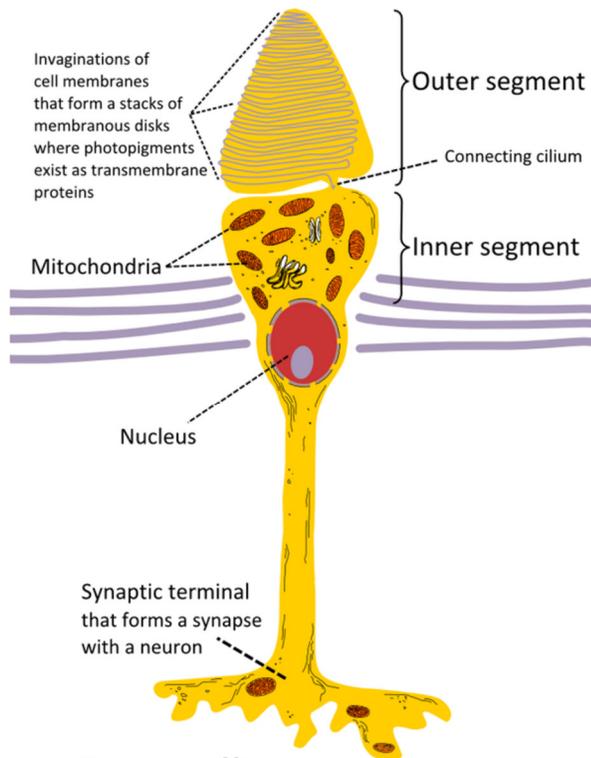


Neuroscience, 2nd edition.
 Purves D, Augustine GJ, Fitzpatrick D, et al., editors.
 Sunderland (MA): Sinauer Associates; 2001.

Figure 16

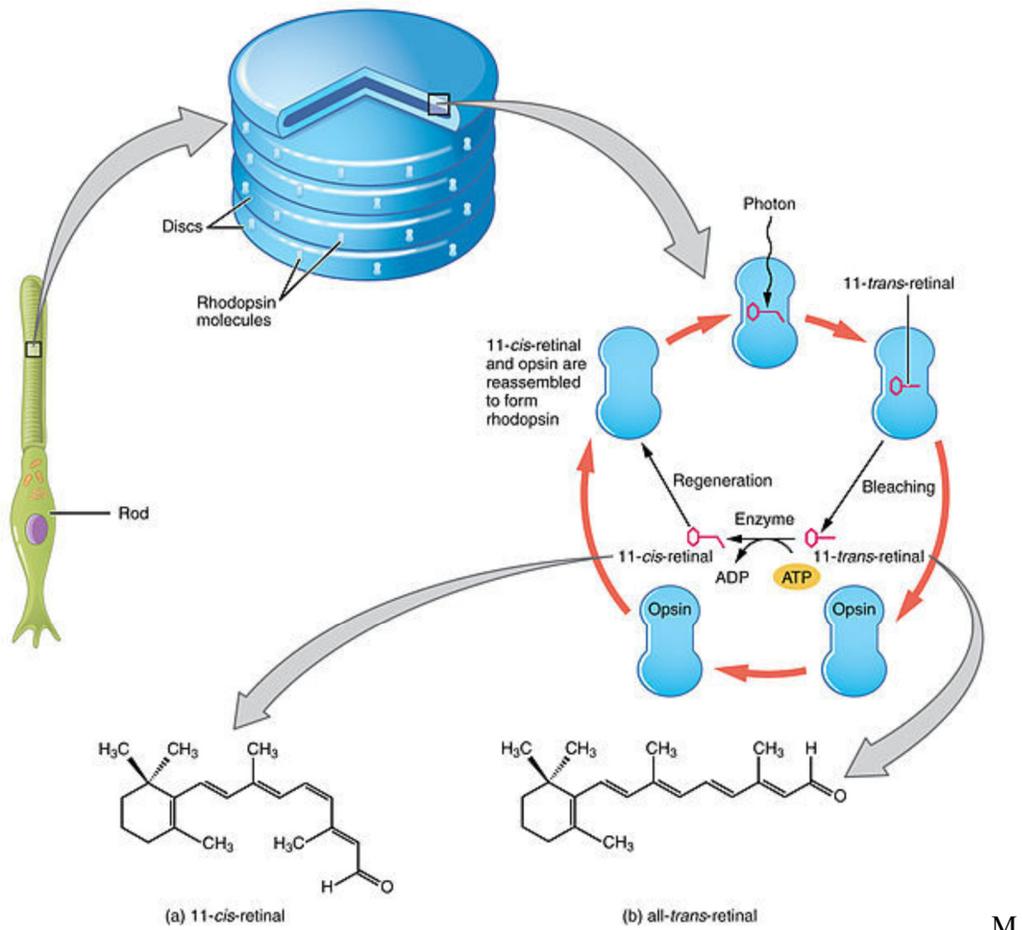


Rod cell



Cone cell

Figure 17



M

The absorption of light leads to an isomeric change in the retinal molecule.

Fig. 18
8 Chakras

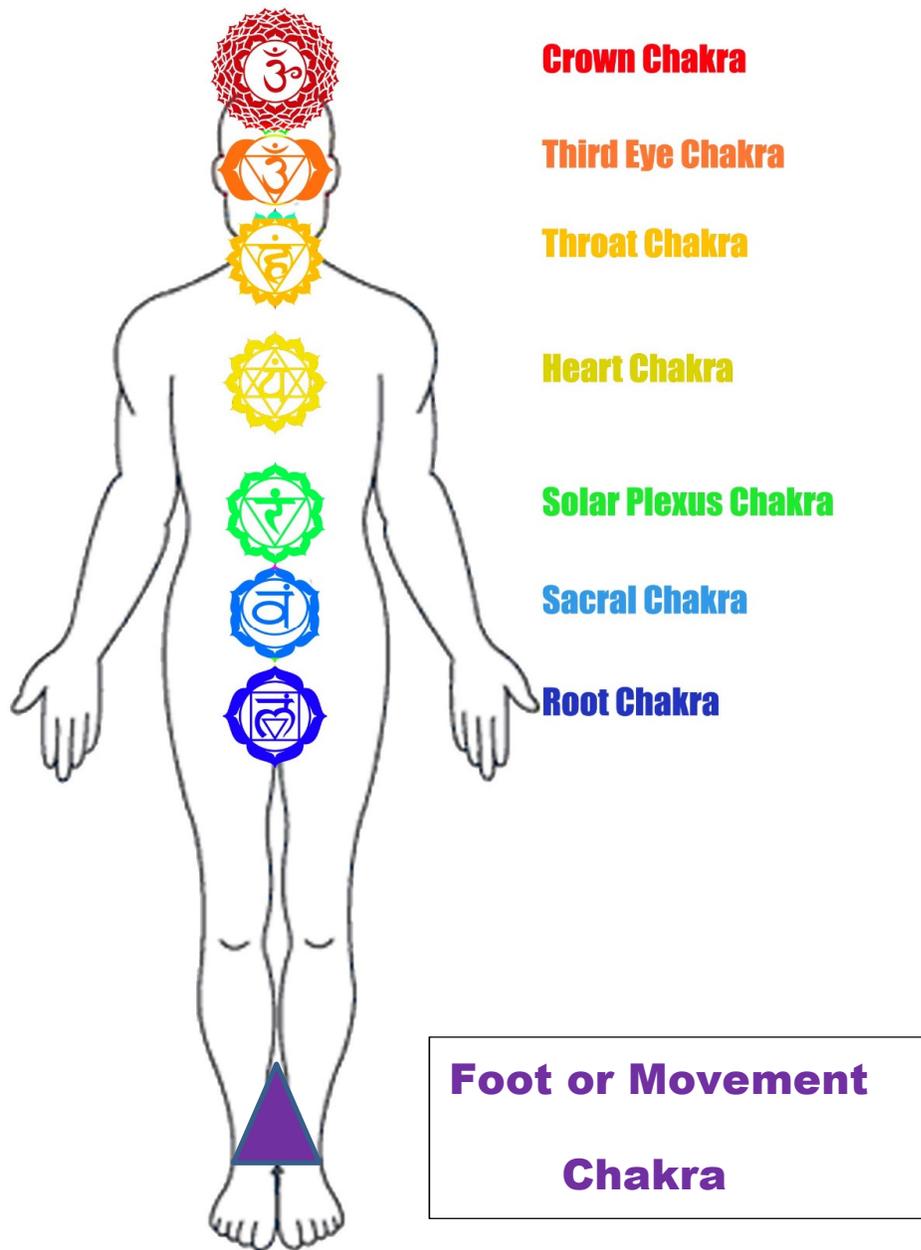


Figure 19

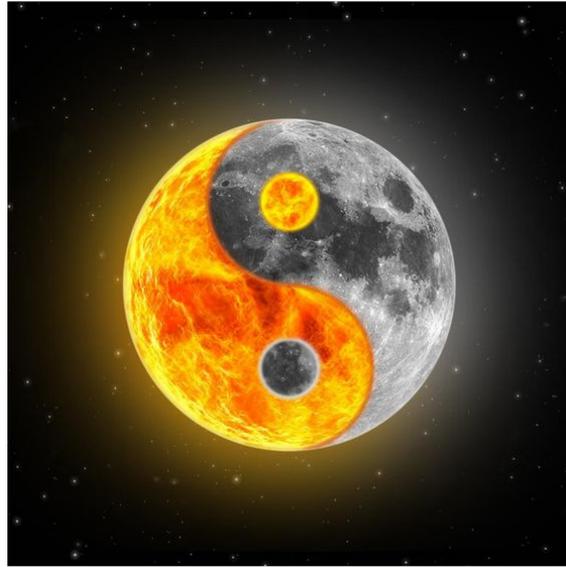


Figure 20

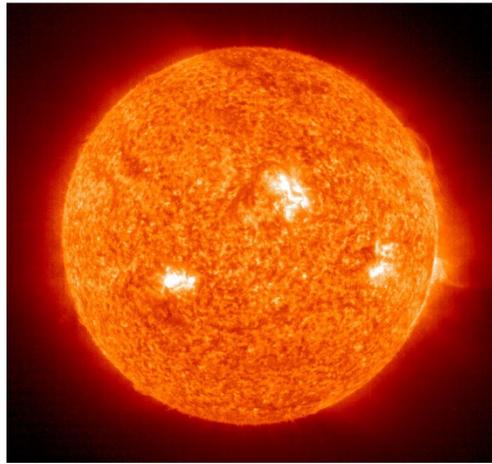


Fig. 21 The Eye of Horus

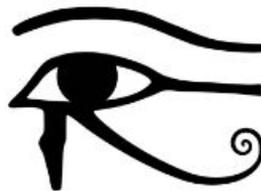
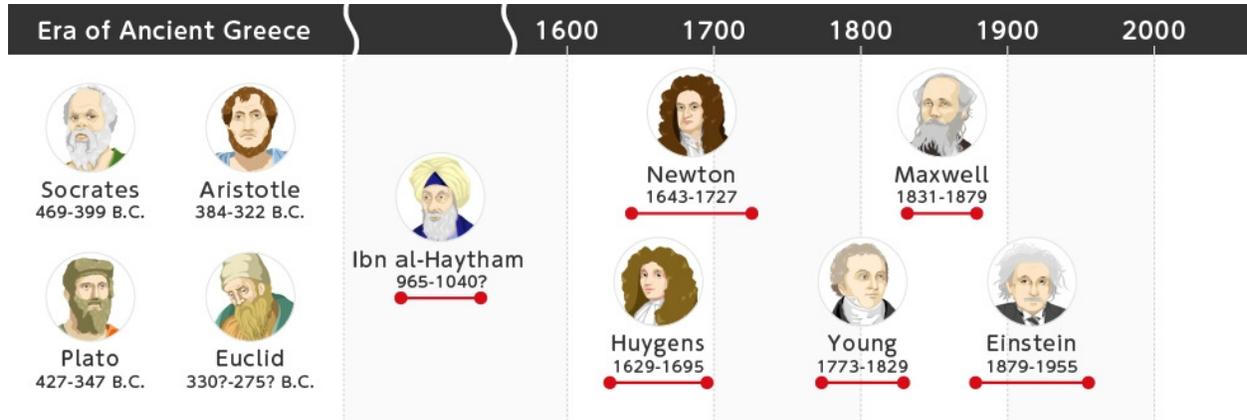


Figure 22

History of Light Thinkers



Bibliography

Albers, Josef The Interaction of Color (50th Anniversary Edition). USA: Yale University, 2013.

A staple reading for artists.

Ames, Jim Color Theory Made Easy (A new approach to color theory and how to apply it to mixing paints). New York: Watson-Guptill Publications, 1996.
A introduction to understanding color theory and application book for artists.

Benson, J.L. (2004) The Inner Nature of Color: studies on the philosophy of the four elements [Kindle version] Steiner Books: www.steinerbooks.org
Retrieved from https://www.amazon.com/gp/product/B008AVOOK8/ref=oh_aui_d_detailpage_o06_?ie=UTF8&psc=1

An Anthroposophical book to steer you in the right direction for an Anthroposophical study into light.

Birren, Faber Color Perception in Art USA: Schiffer Pub Ltd., 1986.

Another helpful book on color for the artist.

Bob, Petr (2011) Brain, Mind, and Consciousness- advances in Neuroscience Research Springer New York Dordrecht Heidelberg London: Springer Science+Business Media, LLC Google Play: Retrieved from <https://play.google.com/books/reader?id=eXmI3Xa2vjEC&pg=GBS.PP1>

We have a long way to go to understand the workings of the cartesian theater in our brain and consciousness. A noble work.

Boynton, Robert M. Human Color Vision USA: Holt, Rinehart and Winston, 1979.

A technical and scientific work on human color vision from a neurological and psychological standpoint.

De Grandis, Luigina Theory and Use of Color New York: Harry N. Abrams, Inc., Publishers, 1984.

A good introduction into the study and use of color.

DeMarco, Donald, Ph.D. Donald DeMarco, PhD The Christian Meaning Of Light Christendom Educational Corporation 1996, Christendom Press, CatholicCulture.org

<http://www.catholicculture.org/culture/library/view.cfm?recnum=3730>

Edelman, Gerald M. , Tononi, Giulio (2000) A Universe of Consciousness: How Matter Becomes Consciousness USA: Basic Books, A Member of the Perseus Books Group, Google Play: Retrieved from <https://play.google.com/books/reader?id=vHSzcFQ6xoQC&pg=GBS.PP1>

Another interesting book.

Edwards, Betty, Color – A Course in Mastering the art of Mixing Colors. USA: TarcherPerigee, 2004

Helpful to the artist in mixing colors.

“Festivals of Light - Judaism “” Victoria and Albert Museum, Referenced 12/24/2017

<http://www.vam.ac.uk/content/articles/f/festivals-of-light-judaism/>

Galton, Jeremy & Martin, Judy Drawing and Painting in Color (How to understand color and make it work for you.) Edison, New Jersey: Chartwell Books, 1995.

Another applications book for artists.

Goethe, Johann Wolfgang von (1840) Goethe’s Theory of Colors: transl. from German, notes by Charles Lock Eastlake, R.A., F.R.S. London: John Murray, Albemarle Street Printed by William Clowes and Sons Google Play: Retrieved from <https://play.google.com/books/reader?id=8Yg5AAAACAAJ&pg=GBS.PR2>

An in-depth view on the aesthetics of color.

Grumbine, J.C.F. (1921) Psychology of Color Cleveland, Ohio: The Order of the White Rose, Google Play: Retrieved from <https://play.google.com/books/reader?id=9PxDAAAAYAAJ&pg=GBS.PP1>

An early work on the psychology of color.

Huyghe, Rene; Zahan, Dominique, Izutsu, Toshihiho; Portmann, Adolf; Rowe, Christopher; Benz, Ernst Color Symbolism (Eranos Excerpts) Zurich, Switzerland: Spring Publications, 1977.

A good guide to color symbolism in different cultures. A experiential view.

Judd, Deane B. (1979) Contributions to Color Science U.S. Department of Commerce: NBS Special Publication 545 Google Play: Retrieved from <https://play.google.com/books/reader?id=jgziI8NAzYC&pg=GBS.PP1>

A very descriptive analysis into color by the National Bureau of Standards.

Laureys, Steven & Tononi, Giulio (2009) The Neurology of Consciousness: Cognitive Neuroscience and Neuropathology, USA: Academic Press, Elsevier, Ltd., Google Play: Retrieved from <https://play.google.com/books/reader?id=KhsebheT23kC&pg=GBS.PP1>
A labyrinth of Neuroscience.

Leadbeater, C.W. Man Visible and Invisible Wheaton, Illinois: The Theosophical Publishing House, 1925.
Colors and their meaning.

Lewis, Richard G. (2014) Color Psychology – Profit from the Psychology of Color: Discover the Meaning and Effects of Color [Kindle version]. Retrieved from https://www.amazon.com/gp/product/B00IIXZJ7U/ref=oh_aui_d_detailpage_o05_?ie=UTF8&psc=1 Riana Publishing
Interesting bits on the effective use color in color psychology.

Mashour, George, A. Edited by, University of Michigan Medical School [2010] Consciousness, Awareness, and Anesthesia New York, NY: Cambridge University Press www.cambridge.org/9780521518222 Google Play: Retrieved from <https://play.google.com/books/reader?id=xDagK-4HqPQC&pg=GBS.PP1>
An interesting book on consciousness.

Maund, Barry, "Color", *The Stanford Encyclopedia of Philosophy* (Winter 2012 Edition), Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/win2012/entries/color/>

Monas, Marian Festivals of Light – Buddhism, Victoria and Albert Museum, Referenced 12/24/2017 <http://www.vam.ac.uk/content/articles/f/festivals-of-light-buddhism/>

Newton, Sir Isaac, Knt. OPTIKS: or, a Treatise of the Reflections, Refractions, Inflections and Colours of Light (4th edition, corrected) London: Printed for William Innys at the West-End of St. Paul's, 1730.
Original work of Sir Isaac Newton on Light.

O'Conner, Zena, Ph.D. (2015) Color Psychology and Color Therapy: Caveat Emptor [Kindle version] Sydney, Australia: Ebook Production, <http://ebookproduction.com.au>.

A wide-ranging study into color psychology.

Orr, Charles Ebert Christianity a Light. Bible Hub Referenced 12/24/2017 http://biblehub.com/library/orr/the_gospel_day_/chapter_i_christianity_a_light.htm

Parramon, Jose M. The Book of Color. New York: Watson-Guption Publications, 1993.

The history of color, color theory, and contrast; the color of forms and shadows; color ranges and mixes; and the practice of painting with color.

Roychoudhuri, Chandrasekhar, Kracklauer, A.F. Creath, Katherine Edited by, The Nature of Light: What is a Photon? Direct Measurement of Light Waves (2008) Boca Raton, FL: CRC Press, Taylor & Francis Group, LLC

<http://www.crcpress.com>, Google Play: Retrieved from <https://play.google.com/books/reader?id=Z6hWmaHZFigC&pg=GBS.PP1>

Heavy Physics regarding light.

Sandbach, John The Mysteries of Color Chicago, IL: The Aires Press, 1979.

Miscellaneous bits of information

Sargent, Walter The Enjoyment and Use of Color. New York: Dover Publications, Inc., 1964

A good help for the artist in employing colors in an intuitive fashion.

Schindler, Maria Goethe's Theory of Color (Applied by). Great Britain, Sussex: New Knowledge Books, 1964.

A guide for Anthroposophical painting.

Schopenhauer, Arthur and Runge, Philipp Otto (2012) On Vision and Colors; Color Sphere transl. by Georg Stahl [Kindle version] New York: Princeton Architectural Press Retrieved from https://www.amazon.com/gp/product/B007N204FO/ref=oh_aui_d_detailpage_o02_?ie=UTF8&psc=1

Two influential and helpful works on color.

Schroff, Lois Color – Its Relationship to Soul and Spirit Fair Oaks, CA: Rudolf Steiner College Press, 2003.

A good introduction into Anthroposophical painting and the written works of Goethe and Steiner.

Seiler-Hugova, Ueli Color - Seeing, Experiencing, Understanding AT Verlag, Aarau: Temple Lodge Publishing, 2011.

Another interesting and insightful Anthroposophical work.

Shakti, Adi The Light - Hinduism Referenced 12/24/2017

http://www.adishakti.org/his_light_within/the_light_hinduism.htm

Sloane, Patricia The Visual Nature of Color New York: Design Press, 1989.

An extensive, thorough and exhaustive work on the subject.

Snow, Bonnie E. & Froehlich, Hugo, B. (1920) The Theory and Practice of Color third edition New York, Chicago: The Prang Company, Google Play:

retrieved from <https://play.google.com/books/reader?id=yZZMAAAAYAAJ&pg=GBS.PP4>

A worthwhile read.

Steiner, R. Being of Man and his Future Evolution, The. London: Rudolf Steiner Press, 1981.

Evolution, involution, and creation out of nothingness.

Steiner, R. Colour. Sussex, Great Britain: Rudolf Steiner Press, 1992.

Steiner directly addresses color.

Steiner, R. Eternal and Transient Elements: The cosmic past of humanity and the mystery of evil. Forest Row, RH: Rudolf Steiner Press (CW), 2015.

Elementals and man's relationship to the cosmos.

Steiner, R. Evolution of the Earth and Man (and the influence of the stars), The. New York: Anthroposophic Press, Inc., 1987.

How did man originate? Earth life and star wisdom. Creation of the Earth and Man through the cosmic evolutions.

Steiner, R. Good and Evil Spirits: and their influence on humanity. Forest Row, RH: Rudolf Steiner Press (CW), 2014.

Good and evil as part of the evolutionary process.

Steiner, R. Initiation Science and the Development of the Human Mind. Forest Row, RH: Rudolf Steiner Press (CW), 2016.

Spirits, Man, and our Planetary System.

Steiner, R. Inner Experiences of Evolution. Great Barrington, Massachusetts: Steiner Books/Anthroposophic Press (CW), 2009.

A more in-depth study of the cosmic evolutions.

Steiner, R. Inner Nature of Music and the Experience of Tone, The . Printed in the USA: Anthroposophic Press, 1983.

Music here is a messenger of the spiritual worlds.

Steiner, Rudolf, Ph.D. (2001) The Light Course-First Course in Natural Science: Light, Color, Sound – Mass, Electricity, Magnetism transl. by Raoul Cansino [Kindle version] Anthroposophic Press: www.anthropress.org
Retrieved from https://www.amazon.com/gp/product/B006VECZNY/ref=oh_aui_d_detailpage_o00_?ie=UTF8&psc=1

A very deep philosophical inquiry into light in its various aspects.

Steiner, R. Macrocosm and Microcosm. London: Rudolf Steiner Press, 1985.

Man, and planetary evolution.

Steiner, R. Man and the World of Stars (The spiritual communion of mankind). New York: Anthroposophic Press, Inc., 1982.

Man's relation to the world of stars.

Steiner, R. Occult Science. USA: Anthroposophic Press, 1979.

Basic make-up of the universe and man.

Steiner, R. Rosicrucian Wisdom (an introduction). London: Rudolf Steiner Press, 2000.

Planetary evolution and human consciousness.

Steiner, R. Spiritual Beings in the Heavenly Bodies and in the Kingdoms of Nature, The . Vancouver, Canada: Steiner Book Centre, 1981.

Another book on the spiritual hierarchies and their dominion.

Steiner, R. Spiritual Hierarchies and the Physical World (Reality and Illusion), The. Hudson, NY: Anthroposophic Press, Inc., 1996.

The relationship between the spiritual hierarchies and their reflection in the physical world. An elucidation of the spiritual guiding the physical in human and cosmic evolution.

Steiner, R. Universe, Earth and Man (In their relation to Egyptian myths and modern civilization). London: Rudolf Steiner Press, 1987.

The evolution of man in relation to cosmic evolution.

Steiner, R. Warmth Course Spring Valley, New York: Mercury Press, 1988.

One of Steiner's several works on hard science. This is a good precursor understanding for his light course. Both courses are indispensable for an anthroposophical understanding of light and color.

Toyoda, Haruyoshi & Ohtake, Yoshiyuki History of research on light. Hamamatsu Photonics K.K. Retrieved 2017 <http://photonterrace.net/en/photon/history/>

A good beginning on the history of research on light.

V, Jayaram Symbolism of Light in Hinduism hinduwebsite.com Referenced 12/24/2017 <http://www.hinduwebsite.com/symbolism/symbols/light.asp>

Wagner-Koch, E. & Wagner, G. The Individuality of Color (Contributions to a methodical Schooling in Color Experience. Switzerland: Rudolf Steiner Press, 2009.

A book on Steiner's use of luster and image colors, with a bent on the creation of anthroposophical art.

Wikipedia Contributors. Nūr (Islam). *Wikipedia, The Free Encyclopedia.*

Wikipedia, The Free Encyclopedia. 12/24/2017

[https://en.wikipedia.org/wiki/Nūr_\(Islam\)](https://en.wikipedia.org/wiki/Nūr_(Islam))

Wikipedia Contributors. History of Optics. *Wikipedia, The Free Encyclopedia*.
Wikipedia, The Free Encyclopedia 12/2015 [https://en.wikipedia.org/
wiki/History_of_optics](https://en.wikipedia.org/wiki/History_of_optics)

Interesting history of optics..

Wilcox, Michael Perfect Color Choices for the Artist Cincinnati, Ohio: North Light
Books, 2002.

A noble attempt at arriving at color harmony for the artist. An applications
manual.

Zajonc, Arthur Catching the Light (The entwined history of light and mind).
Printed in the USA: A Bantam Book, February 1993.

A great book marrying Anthroposophy and traditional Physics with a direct
understanding of light as a human experience.