

An exploration into the use of Music for the purpose of Healing by Bill Osmer, December, 2006

INTRODUCTION TO RAGA RAGANI VIDYA

The purpose of this paper is to introduce and explain the concepts and methodology of Indian music known as Raga Chikitsa and Raga Ragini Vidya as revived and developed by my guru, Sri Ganapathi Sachchidananda Swamiji of Avadhoota Peetham, Mysore, India, and to show how music fits in with Ayurveda as a healing modality. First a look at the principles and origins of Indian and Western music.

I. ORIGIN OF INDIAN MUSIC *

The purpose of this section is to give a brief summary of the origins and development of Indian music to its present day form and also to show that its history is inseparable from spirituality. Indian music is probably the most complex musical system in the world, with a very highly developed melodic and rhythmic structure. This includes complicated poly-rhythms, delicate nuances, ornamentations and microtones which are essential characteristics of Indian music. Indian music had its origins in the Vedas (4,000 B.C. to 1,000 B.C.). Four in number, the Vedas are the most sacred texts of India, containing some 1,000 hymns. They were used to preserve a body of poetry, invocations, and mythology in the form of sacrificial chants dedicated to the Gods. Great care was taken to preserve the text, which was passed down by oral tradition, so much so that both the text and the rituals remain unchanged to this day. The literature of the Vedas, is divided into 4 parts: Rig Veda, Sama Veda, Yajur Veda, and Atharvana Veda. The oldest, the Rig Veda, dates back to about 4,000 B.C. it was recited, at first, in a monotone and then later developed to 3 tones (one main tone and two accents, one higher (uddatta) and one lower (anudatta), respectively. This was done to accentuate the words, since the text was of primary importance. The Yajur Veda, which mainly consists of sacrificial formulas, mentions the "veena" as an accompaniment to vocal recitations during the sacrifices. By this time, the chants had evolved to two main notes with two accents, which formed the first concept of the tetrachord (4 note chord).

The Sama Veda laid the foundation for Indian Music. The origin of Indian music can be traced back to this Veda. Three more notes were added to the original tetrachord, resulting in the first full scale of seven notes. These original seven notes used in reciting the Sama Veda became the first ragas and according to Sakuntala Narasimhan in *Invitation to Indian Music*, it later became known as the Kharaharapriya raga of the Carnatic (South Indian) system of music.

As mentioned before, Indian music developed from the Sama Veda. This music, which was prevalent throughout the entire length and breadth of India, became more and more advanced every century due to the contributions of scholar-musicians like Bharata, Matanga, Sarangadeva, and Venkatarnakhi. All of these musicians made great contributions to both Sacred and Art music and are collectively responsible for the modern styles of bhajans, kirtans, concert formats, training techniques, etc., still used today.

Around the 12th and 13th centuries A.D. there was a bifurcation into the two distinctive systems

of South Indian (Carnatic) and North Indian (Hindustani) music. This happened as follows: In the 12th and 13th centuries A.D., the northern part of India went through a series of invasions by Muslim rulers from Asia minor, who were on a crusade to spread their religion *Islam*. These rulers settled in the North and due to the interaction between the invaders and the local people, changes began to take place socially. The music was highly influenced by the Arabic and Persian styles, resulting in a totally new style of music, namely Hindustani music. This literally means the "Music of India," *Hindustan* being the Hindi word for "India." In the South, the music continued to develop along the same lines, without any external influence and came to be called "Carnatic" music which means "traditional" in Tamil language.

Below is a chart summarizing and highlighting the scriptural lineage and history of Indian music. The history is divided into the Ancient period (4,000 B.C to 400 A.D.), medieval period (5th century A.D. to 15th century A.D.) and the Modern Period (16th century A.D. onward).

Ancient Period 4,000 to 1,000 B.C.

1. Vedas (4,000 B.C to 1,000 B.C)
2. Upanishads (1,000 B.C to 300 A.D.)
3. Ramayana and Mahabharata (400 B.C)
4. Bharata's Natyashastra (300 B.C)
5. Matanga's Brihadesi (400 AD.)

Medieval Period

1. Jayadeva's Geeta Govinda (12th Century)
2. Sarangadeva's Sangeeta Ratnakora
3. Bifurcation into 2 systems of music
4. Purandara Dasa (1484-1564)

Modern Period

1. Venkattamakhi (early 17th century)
2. Shyama Shastri (1762-1827)
3. Tyagaraja (1767-1847)
4. Muttuswamu Dikshitar (1776-1827)

It was Venkattamakhi, the great scholar, who devised the system of Parent and Derived scales.

Carnatic system has a very complete system of 72 parent scales (known as "Mela Kartas") which are worked out in a very logical and precise manner. Derived from these we have thousands of ragas.

It is important to note here that Indian music has at its roots a spiritual concept that is always present philosophically and musically: the idea that creation is a manifestation of consciousness at different levels of vibration. From the Samkhya philosophy of creation to numerous verses of the Vedas and upanishads, this idea resonates as shown in these two scriptural verses:

"Sound is not what one should desire to understand. One should know the hearer." - *Kausitaki Upanishad, vs 3:8*

"We worship that divine sound, the life of consciousness in all beings and the supreme bliss, unmanifested in the form of the universe. By the adoration of sound, the Gods Brahma, Vishnu and Shiva are truly worshipped, for they are the embodiment of sound."

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Sangitaratnakara, VS. 1.3.14

The Sanskrit language is particularly rich in words for "sound," three of which I will briefly discuss here because of their relationship to music. They are *sruti*, *swara* and *nada*. "Sruti" literally means "that which has been heard." The role they play in music is as minute pitch changes, not discernable in themselves but inferred as the subtle differences between one perceivable musical sound and another. Each of the seven Swaras or musical notes was separated from its neighbors by intervals of two, three or four srutis. There are 22 srutis in one octave.

The word swara means "that which manifests itself," or "that which shines forth of its own nature." Swara is generally interpreted as meaning "musical note," one of the seven steps of the musical scale within an octave. However, to more completely understand the meaning, the seven swaras must be recognized as general scale steps, unspecified as to their precise pitch or tuning.

Nada is usually translated as "causal sound" and is derived from the Sanskrit root *nad*, which means "to sound" or "to reverberate." This is also the root of the word nadi, which means "to flow" or "river." Nadis are the subtle nerve channels in which life energy flows throughout the body. Nada is a word with a broad range of applications: (1) in the special sense of primordial sound, the pervading causal sound that animates the universe, (2) as a general word for musical sound, (3) as a term for the process of emerging vocal sound as it wells up from its inner source and flows outward along the bodily channels and (4) the improvised exposition of a "raga:" wherein the true and unique qualities of a raga are brought out.

The following quote from the Brhaddesi of Matanga illustrates the deeper meaning of the word, *nada*:

**"Now I shall ex-pound the highest definition of nada:
Without nada, song cannot exist."**

**Without nada, the scale degrees cannot exist.
Without nada, the dance cannot come into being.
For this reason the entire world becomes the embodiment of nada.
In the form of Nada, Brahma is said to exist; In the form of nada, Vishnu;
In the form of nada, Parvati; in the form of nada, Shiva.
That inner region which is said to be the abode of Brahma is called the brahmagranthi.
Vital air is situated in its center, from this mass of vital air fire arises.
From the combination of fire and air, nada is born."**

Brhaddesi of Matanga

There was and clearly is a reverence for sound and music as spiritually based in the Indian philosophy.

ABOUT RAGAS

Raga is often described as a scale or a mode. This is an incomplete definition of the Raga. Though it is based on a scale, the concept of the raga is much more complex. Verses in the old treatises of music such as Sangitaratnakara describe a raga as "that which gives pleasure to the mind of the listener." Every raga has its own definite characteristic which makes it easy for a discerning listener to recognize it. Based on a scale of five, six or seven notes, the raga has special features like melodic ornamentations (gamolkas), the incorporation of microtones (srutis), and importance given to certain notes, *vadi* and *samvadi*. The *vadi* is the most important note used in the raga and is usually one of the notes in the first tetrachord (first half of the scale), whereas the *samvadi* is the second most important note and is the second tetrachord (second half of the scale.)

Just as Western music recognizes seven notes within an octave, Indian music has the swaras (notes) sa, ri, ga, ma, pa, dha, ni and (octave) sa. Of these, sa (the basic note) and pa (the fifth note) are invariant, while the remaining five notes have two varieties each - the komal (flat) and the tivra (sharp), making a total of 12 semitones. The 12 consecutive keys of the piano will illustrate these. Using these semitones, one can "make" different ragas by choosing any 5, 6, or 7 colors out of 12 given colors in a multitude of ways. By choosing and dropping different sets of notes and changing the ascending and descending orders, it is possible to make up thousands of ragas, each one different from the other, up to 72,000. It is interesting to note that according to the esoteric texts of Indian philosophy there are said to be 72,000 nadis or subtle channels in the human body.

The scholar Ventakatakamhi was the first to systematize the raga system into 72 parent scales from which all other scales could be derived. This is known as the Melakarta system of Carnatic music. The melakartas or parent scales are scales using the same seven notes in ascending and descending natural order. These are worked out by a systematic formula of permutations and combinations of the 12 basic notes.

The 72 melakartas are divided into two halves. The first 36 scales all have a perfect or natural fourth (shuddha madhyama) and the scales of the second half are repetitions of the first 36 with an augmented fourth (pratimadhyama). The melakarta is also divided into 12 chakras or cycles

of six scales each. The Tonic (shadja) and Dominant (panchama) are constant in all the 72 scales. The 36 scales are worked out like this: Within each chakra or cycle, the second and third degree (rishabha and gandharva) are kept constant and the sixth and seventh degree (dhaivata and nishada) keep changing, resulting in six scales in each cycle.

Since it is worked out with a formula, one can figure out the notes of a particular malakarta if given its number in the scheme.

The 72 melakartas are as follows:

Shuddha Madhyama

I **1**

Kanakangi

IV **19**

Jhankaradhvani

2	Ratnangi	20	Natabhairavi
3	Ganamurti	21	Kirvani
4	Vanasoati	22	Kharakharapriya
5	Manavati	23	Gaurimanohari
6	Tanarupi	24	Varunapriya

II **7**

Senavati

V **25**

Mararanjani

8	Hanumatodi	26	Charukesi
9	Dhenuka	27	Sanasangi
10	Natakapriya	28	Harikambodi
11	Kokilapriya	29	Dhirashankarabharana
12	Rupavati	30	Naqanandini

III **13**

Gayakapriya

VI **31**

Yagapriya

14	Vakulabharanam	32	Raqavardhani
15	MayamalavaQaula	33	Ganqevabhushani
16	Chakravalam	34	Vagadhisvari
17	Survakantam	35	Sulini
18	Hatakambari	36	ChaJanata

Prati Madhyama

VII 37

Selacam

X 55

Svamalanoi

38	Jalamavam	56	Sharmukhapriya
39	Jhalavarali	57	Simhendra Madhvama
40	Navanitam	58	Hemavati
41	Pavani	59	Dharmavati
42	Raghupriya	60	Nitimati

VIII 43

Gavambhodhi

XI 61

Kantamani

44	Bhavapriya	62	Rishabhapriya
45	Shubhapantuvarali	63	Latanqi
46	Shadvidhamargini	64	Vachaspati
47	Suvamangi	65	Mecha kalyani
48	Divvamani	66	Chitrambari

IX 49

Dhavalambari

XII 67

Sucharitra

50	Nauranaravani	68	Jvofisvaruoini
51	Kamavardhini	69	

Dhatuwardini

52	Ramapriva	70	Nasika Bhusani
53	Gamanasrama	71	Kosalam
54	Visvambari	72	Rasikapriya

Derived scales from the melakarta or parent scales are called janya scales.

In Carnatic music, the vadi (most important note) is not spelled out explicitly, but each raga does have a predominant note that sets the mood pattern and emphasis is taken care of implicitly in practice rather than in theory. For example, Raga Sankarabharanam (which corresponds to the major diatonic scale in Western music) takes all even notes in the octave, but you do not pause on the note ri or dha and you would stress ga instead.

It is in this sense that each raga is said to have a "jiva swara" (life giving note). Omit this all-important note, or underplay it, and what you get is a lifeless raga. All these details about dominant note, notes to be used sparingly, and the rules for ascent and descent together define a raga, although for the sake of simplicity, it is defined in terms of notes taken. In fact, ragas are treated not only as mood pictures, but as melodic entities, each with a personality of its own. Medieval musicologists even classified ragas as male or female, husband and offspring, etc. Others suggested a hierarchy of slave ragas and messenger ragas, while others divided ragas into superior, middling, and inferior ragas, depending on their suitability for pure elaboration, or for only fragments of song, or mixed melodies. These classifications are all now only of historical interest.

One other classification that is still followed in Hindustani music, groups ragas according to the time of day or night allotted to each as appropriate. Since moods of the ragas depend on the notes taken (combinations of the lower varieties of ri and ga, for instance can add a tinge of pathos, while sharp notes create a feeling of arousal), the time theory of ragas groups ragas according to the notes employed. Ragas taking the higher varieties of ri, dha, and ga are to be played following dusk and dawn. Nighttime melodies use mostly *ma* (sharp). Early evening ragas are characterized by ri and dha becoming weak or disappearing altogether before twilight. For the purposes of this theory, the 24 hours of the day are divided into eight sections of 3 hours each and the definition of a raga will include, along with the notes taken and the vadi swara, a mention of the time allotted for it, too. Carnatic music does not follow such classifications.

II. WESTERN MODES OF MUSIC IN SOUND HEALING

When examining the role of music as a healing modality, one must look both East and West. Following is a brief look at the role of Western research in understanding the effect of music on the human mind, as well as a technical overview of the science of sound and music.

Recently, there has been an explosion of interest and exploration in using sound and music for

healing and therapy in the West. The uses, goals and methodologies are quite varied. I will give here a brief synopsis of some of the more popular Western methods to outline the different approaches and to compare and contrast with raga chikitsa.

In general Western music therapy techniques seem to fall into categories of using sympathetic vibrations and / or harmonics to achieve desired mental states of activity or to use the emotional responses of music in the mind as a form of therapy or to explore the relationship of the ear, brain and mind.

One of the earliest pioneers in these matters was Alfred A. Tomatis, M.D., a French physician, psychologist, and ear specialist. After earning his medical degree in Paris he specialized in diseases of the ear and throat. In the late 1950's Dr. Tomatis began experiments in auditory stimulation for children with speech and communication disorders. Also his clinical work with opera singers led him to observe that the human voice can only produce sounds the ear can bear. This discovery was recognized by the French Academy of Medicine in 1957 and named the "Tomatis Effect."

"Listening is, in a way, the most elaborate manifestation of the ensemble of our perceptions working in a synergistic manner under the control of the ear. We know now, after all that we have said about it, that the ear is not only man's most essential organ, but is also his "neurological body." Engaged in listening, the nervous system thus becomes a springboard for the listener. But unfortunately, humanity only imperfectly and incompletely uses this fabulous mirror, which captures ideas and diffuses them, which perceives reality and passes by illusion. It does this so well, that one could say that the brain is the annex of the "listening man," and that the more he listens, the more human he becomes." **

Dr. Tomatis pioneered sound therapy treatments for ear and throat disorders and has developed many innovative theories regarding hearing frequencies and parts of brain stimulated. His work was very influential to other researchers of sound and music therapy in the West. Here are some of his core principles****

1. The primary function of the ear is to convert sound waves to electrochemical impulses that charge the neocortex of the brain.
2. Sound is a nutrient; we can either charge or discharge the nervous system by the sounds we take in through both air and bone conduction.
3. There is a distinction between hearing and listening. The two are related but distinct processes. Hearing is passive, listening is active. This corresponds to the difference between seeing and looking. Listening and looking are active focusing processes.
4. The quality of an individual's listening ability affects both spoken and written language development. Listening ability also influences communication, thereby shaping the individual's social development, confidence, and self-image.
5. The active process of listening can be enhanced or refocused by auditory stimulation using musical and vocal sounds rich in high frequencies. (In Tomatis' research, this entailed the

use of filtered and enhanced audiotapes using music of Mozart and Gregorian chant.)

6. Communication is a process that begins in utero, The unborn child hears as early as the fourth month after conception. Sound actually helps the fetus brain and nervous system grow.

7. We duplicate only the sounds that we can hear. This is known as the "Tomatis Effect."

Another pioneer is Don Campbell, developer of "The Mozart Effect," who, based on the work of Dr. Tomatis, began experimenting with Mozart's violin concertos and symphonies containing higher frequencies, to help children with dyslexia, speech disorders and autism.

Mr. Campbell was a music teacher and critic by profession, but continued to research the effects of music and eventually developed expertise in the use of music in health and human development and was instrumental in his work with universities, learning centers, health care organizations and even symphony orchestras to inspire and continue research of this type. He developed "The Mozart Effect" which is an inclusive term signifying the transformational powers of music in health, education and well-being. Many of the clinical studies relating music and sound therapy to learning disorders, ADD, autism, dyslexia, speech disorders, sleeping disorders as well as research in memory, awareness, learning and depression can be traced to Mr. Campbell's work.

Manfred Clynes, D. Sc is an academic leader in the studies of the emotional responses to music. He holds a doctorate from the University of Melbourne as well as an M.S. from Julliard School of Music in New York. He also did graduate work in the psychology of music at Princeton University. He is noted in Physiology for his discovery of the biological law of unidirectional rate sensitivity, and he invented the Computer of Average Transient (CAT), a standard tool used in laboratories for assessing brain function. He is an important link in the scientific validation of music and sound therapy, especially in that different frequencies affect different parts of the brain.

Some of the most useful and interesting research into the relationship between brainwaves and states of consciousness was done by British researcher, C. Maxwell Cade. By using a specially designed EEG brain monitor and an electrical skin resistance meter, he was able to demonstrate a correlation between highly specific states of consciousness and their underlying brainwave patterns. This new type of EEG machine mapped brainwaves by measuring the activity of 15 different frequencies. This detailed picture of brainwave activity was correlated with subjective and objective measurements of the physical and psychological state of the subject.

Based on the work of Cade, Dr. Jeffrey Thompson, Dr. of Behavioral Psycho-acoustics and 1 euro-acoustic Therapy, has researched and developed perhaps the most interesting and therapeutic approach to sound therapy using a Western approach, called Brainwave Technology. Brainwaves are electromagnetic wave forms produced by the electrical and chemical activity of our brain. As mentioned before, they can be objectively measured with sensitive electronic equipment. This is the basis for an electroencephalogram or EEG. The frequencies of these waves are measured in cycles per second or Hertz (Hz). Brainwaves

change frequencies based on the neural activity within the brain. While Cade demonstrate that mental states reflect a complex blending of various frequencies of brainwaves, it is still quite common and useful to identify and discuss 4 bands or ranges of brainwave frequency. They are Beta, Alpha, Theta, and Delta waves. Before briefly discussing these 4 range of brainwaves, I want to mention that the normal range of hearing in a healthy human is 20 Hz to 20 kHz, so other than some of the Beta waves, all frequencies are below the range of being audible.

Beta waves (frequencies ranging from 13-30Hz) are most typically associated with normal waking states in which we are focused on external stimuli. Beta is borne out of our basic survival orientation and is most present when we are sorting out and making sense of the external world. Beta affords the quickest response and allow us to attend to the largest number of things. Beta is increased in moments of Stress or anxiety, enabling us to manage situations and solve immediate problems.

Alpha waves (frequencies ranging from 8-13 Hz) indicate an alert state with a quiet mind. In this state, attention may be focused outward for problem solving or inward to achieve an alert meditative an example of entrainment. The first tuning fork is said to have entrained the second. Entrainment can apply to both rhythm and frequency.

The same principle of entrainment can be applied to influence human brainwave patterns. Studies using EEG equipment to measure brain waves show a clear correlation between brainwave response and external pulses experienced by the subject. Initially research in this area used pulsating light flashes, but later this effect was found to work with a variety of different pulse phenomena, including sound pulses and even electromagnetic pulses. If pulses at a consistent frequency are introduced into the brain by visual, audio, electrical means, the brain has a natural tendency to follow or "lock on" to their frequency. This is known as "frequency following response."

Dr. Thompson began experimenting with the effects of sound pulse frequency patterns and their effect on brainwave function in the early 1980s as well as the therapeutic uses of binaural and three-dimensional recording to stimulate one's own brain to a specific state of consciousness. Dr. Thompson began to create a series of recordings that use sound frequency patterns built into musical sound tracks for acoustic brainwave entrainment, knowing that the brain tends to match its own wave pulses to those of exterior sound pulses.

The pulses are created by altering the frequencies which go into your right and left ears. A differential is set up which causes "beats" between the right and left hemispheres of your brain. As an illustration, suppose we introduce an audio signal of 100Hz (well within the range of both recording and human hearing) into the left ear and a signal of 108Hz into the right ear. The effect of the pulses would be that the brain would entrain itself to 8 Hz, or within the range of alpha waves. This entrainment technology used by Dr. Thompson is subtly blended into a soundtrack of musical and natural sounds, and up to 15 different brainwave frequencies can be incorporated into each soundtrack. Each layer of instrumentation is embedded with a specific brainwave frequency. At the beginning of each program, Dr. Thompson embeds somewhat rapid pulses allowing the brain to state. Alpha may be dominant in state of focused concentration in the attainment of a still inner center. Increase alpha is often present in people

who practice meditation or yoga, when the mind moves from external to internal worlds as when you close your eyes or begin to drift off to sleep.

Theta waves (frequencies ranging from 3.5-8 Hz) reflect a mind state that is attuned to visualization, imagery and creative inspiration. These waves tend to be produced during deep meditation and creative inspiration. These waves tend to be produced during deep meditation as well as daydreaming. Theta waves are dominant during REM sleep, when most dreams take place. In their waking appearance, theta waves indicate access to intuitive knowledge and deeply rooted imagery. Theta is often associated with creativity and artistic endeavors.

Delta waves (frequencies ranging from 0.5-3.5) are associated with the deepest levels of physical relaxation. The slowest of the brain wave frequencies, Delta is the rhythm of dreamless sleep. Delta waves are usually associated with the processes of physical rejuvenation and healing.

Before discussing the work of Dr. Thompson further, a brief explanation of the concept of resonant entrainment is necessary. Resonant entrainment is a well understood principle within the physical sciences and is key to understanding the workings of the music and sound therapy systems of Dr. Thompson as well as the Raga Ragini Vidya of Sri Swamiji and many others. The history of entrainment in the West started in 1665 when Dutch scientist Christian Huygens discovered that two pendulum clocks mounted side-by-side on the same wall, would gradually come to swing at the same rate. He found that this held true consistently as if "they wanted to assume the same rhythm." From his investigations sprang an understanding of what is today termed entrainment. In the case of the two pendulums, one is said to entrain the other to its frequency. Similarly, if a tuning fork designed to produce a frequency of 440 Hz, for example, is struck, a second tuning fork in its vicinity (also designed to vibrate at 440 Hz) will begin to vibrate. This "sympathetic vibration" is also "lock-on." Once engaged, the pulses are gradually slowed down to the frequencies of the desired entrainment range. Dr. Thompson even developed a method of "brain hemisphere synchronicity" that allows the listener to experience the benefits of the above mentioned methodology with the use of headphones, which would normally be necessary for the required isolation of left and right ears.

Lastly I want to acknowledge the work of Jonathon Goldman, director of the Sound Healers Association. Mr. Goldman has been instrumental in both the spiritual and scientific viewpoints in how to use the transformative power of sound for healing on physical, emotional, mental and spiritual levels. He places much importance in the understanding and use of harmonics or overtones, the purest form of therapeutic sound, in his work. A brief explanation of harmonics or overtones is helpful here. Harmonics are a phenomenon of sound whenever sound is created. Normally we perceive what seems like single tones when we hear a note struck on a musical instrument or our own voices. But in reality, what is created are mixtures of pure tone frequencies called "Partials." The lowest such frequency is called the fundamental. All partials higher in frequency than the fundamental are referred to as overtones, or harmonics, and the few that are lower than the fundamental are called sub-harmonics.**** Sound is a vibrational energy which takes the form of waves which are scientifically labeled as Hertz (Hz) which measure the cycles per second which sound vibration creates. This rate is objectively known as the frequency and subjectively experienced as pitch. The slower a sound vibrates, the lower the

sound pitch we perceive; the faster it vibrates, the higher the sound pitch we perceive. ON a piano the lowest note vibrates at 27.5 Hz and the highest at 4186 Hz.

Different frequencies which have specific measurement create the different notes that make up the Western musical scale that we use today. If we examine the notes on a piano, we find they have been divided into 7 white keys and 5 black keys. The 7 white keys represent the notes of the major or diatonic scale in Western music, starting with C, D, E, F, G, A, B, and ending again with C. The black keys represent the sharped (or flatted) notes between the white keys on the piano. They are C#(Db), D#(Eb), F#(Gb), G#(Ab), and A#(Bb).

If a string on a piano vibrates at 256 times or cycles a second, we say its frequency is 256Hz. This 256Hz frequency creates a note whose pitch is called C. On a piano, a note that vibrates as 293 Hz is a D, one that vibrates at 330Hz an E, at 349Hz an F, at 392Hz it is a G, at 410Hz and A, at 494Hz a B and at 512Hz it is a C once again.

In the different systems of tuning musical instruments, different frequencies for particular notes occur. The note C, for example, may vary from 251 Hz to 264 Hz and the other 5 notes of the scale many also vary a great deal. This depends on where you are tuning an instrument (its concert pitch differs in Europe and the .s.A.) and the instrument you are tuning (a piano tunes differently than a violin).

The subject of tunings is quite complex. Differences in tunings have to do with mathematics. If we call a note vibrating at 256 Hz, the note C, and a note vibrating twice as fast (512 Hz) an octave above that C, there are many ways to divide up the other notes between these two Cs. Some tunings are based upon the harmonic series and have to do with harmonic ratios. Other tunings are based upon an equal division between the notes. It is an intriguing and complicated subject.

With the example of a string which is struck and vibrates at 256 Hz, and which we refer to as a C, when we listen to that string we usually hear, first and foremost, the C note. This is referred to as the fundamental tone. However, when that string is vibrating at 256 times a second and that C is sounding, many other notes besides the fundamental tone are also sounding. These are the overtones.

While in many cases we cannot individually distinguish the different overtones which are sounded, these overtones contribute to the overall sound color or timbre of an instrument. Different instruments will all produce overtones, but specific overtones are most prominent in different instruments. Different instruments will all produce overtones, but specific overtones are most prominent in different instruments. These most prominent overtones are called formants. They are the area of the sound spectrum where the sound energy is most highly concentrated.

Overtones are responsible for shaping the individual sounds that we hear, and for giving instrument their uniqueness. If you remove harmonics from different instruments using filters you would have trouble distinguishing the same C note on the instruments. When the harmonics are audible, you can easily hear the same C note as played on piano, violin, or trumpet. Overtones are also present in our voices, and in fact are responsible for our unique speaking and singing qualities, based on its own specific formants, which sound when we speak

Overtones are mathematically related to each other. Continuing with the example of the C note at 256 Hz, the first harmonic is sounding at twice the vibration at 512 Hz or 2:1 ratio. This creates a note which is referred to as the interval of an octave of the fundamental and is also called a C. An interval is the difference in pitch between two tones. An example of this is the hitting of any two keys on a piano. The difference between these keys is called an interval.

In theory, the overtone series goes on indefinitely with each overtone being a geometric multiple of the fundamental tone, going faster and faster, higher and higher. Some overtone pitches do not exactly relate to Western notes, but they do create microtones which are utilized in the raga system of India.

What is most important to realize about harmonics or overtones is that they are mathematically interrelated. For example the proportions of the second and the third overtones create a ratio of 3:2. This interval is called the fifth. These relationships may have profound effects upon the harmonics and healing aspect of sound. In the chart given previously, the notes, frequencies and harmonics were based on C as the fundamental. The same harmonic ratios arise regardless of the fundamental tone that is struck, though different pitches are created depending on the fundamental. If we were to take the notes sounded by that fundamental C and put them together to create a scale from them, we would have a scale composed of C, E, F#, G, A-, Bb- and C. Interestingly, this scale which arises from the harmonic series of the first four octaves is known as Raga Saraswati in the Indian musical system. Its name is after Saraswati, the Indian Goddess of Music and Science.

The first person in the West who correlated the relationship between musical intervals was the 6th Century B.C. Greek philosopher, Pythagoras, who is best known to our civilization as the father of geometry. Interestingly, Greek God Apollo was God of both medicine and music.

The key to Pythagoras' discovery was a simple instrument called the monochord, which was a single string stretched over a piece of wood. Using the monochord, he was able to discover that the man-made divisions this string created ratios by pressing down on a string and by examining these intervals he found that the whole number ratios could be observed. If for example a string is divided into two equal portions, the note that is created is an octave of the open string. When the string is divided into 3 equal portions the string vibrates at a ratio of 3:1. Looking back at the ratios created from the harmonic series, it is noted that the man-made division of the strings exactly follows that ratios for the harmonic series.

All this information as well as much more of harmonics and their relationship not only to music, but architecture, astrology, art, Kabbala, shamanism and many other esoteric and occult systems has been brought out by Mr. Goldman in his numerous books and CDs. He is particularly interested in harmonic chanting in which the human voice can produce numerous overtones of one note (as in Sufi, Gregorian chants, Tibetan chanting and many native people's musical and ritual systems.)

I have also included all this information because it is most helpful in the understanding of the raga or musical scale system of India.

III. RAGA RAGANI CHIKITSA: INDIAN MODE OF MUSIC THERAPY

Simply defined, *Raga Chikitsa* means "healing through the use of raga." Raga Ragini Vidya is defined as "the knowledge of how to use raga for the purposes of healing. Sri Swamiji explains that his method of healing through music is a lost ancient art and that he is reviving this knowledge in modern times. Identification of the Indian Classical Ragas (Carnatic) and their consonance with the elements of nature (pancha bhutas) helped Swamiji trace the concepts related to "Music for Healing and Meditation." Sri Swamiji says, "My way of rendering music and treatment of ragas is generalis not outside the frame of orthodox tradition. Music is considered as the fourth Upaveda, the Gandharva Veda, in addition to Dhanurveda, Ayurveda, and Artha Shastra. I use devotional music as means of spiritual energy transmission. Some Higher Force takes care of my process, once I decide to heal through music. Swara Shuddhi (pure notes) is held in great veneration and is considered as a standard of musical truth. Melody (raga) is the result of Swara Shuddhi. There is clarity and pure energy in such a melody." *****

As mentioned before, one of the unique and fundamental features of Raga Ragini Vidya is the classification of the ragas based on their elemental composition (ether, air, fire, water, earth) and the proper use of the elements to balance the nature of the imbalance. This is the basic healing methodology of Ayurveda, as well. Another unique and fundamental aspect of Swamiji's method is the Vedic recognition that each of the seven swara (notes) has a presiding deity and that the qualities of the deities and their relationships to the raga as an entity is of paramount importance for the proper use of the raga as a healing modality.

Below is a chart summarizing the seven basic swaras, or notes, present in a raga:

Scale Degree	Name	Abbreviation	Derivation	Meaning	Presiding Deity
1	sadja	sa	sad (6) + ja (bottom)	Bottom of the 6 organs of utterance	Agni
2	rsabha	n	rsabha (bull)	He whose flowing semen impregnates the herd	Prabhu
3	gandharva	ga	ghanda (fragrant)	The fragrant note	Saraswati
4	madhyama	ma	madhya (middle)	Middlemost	Parameshwara
5	panchama	pa	pancha (five)	The fragrant note	Maha Vishnu
6	dhaivata	dha	dhi (perceive)	n/a	Maha Ganapati
7	nisada	ni	ni (down) + sad (sa)	Final note	Suryanarayana

The method of Raga Ragini Vidya involves the appropriate use of the raga scale for the five elements. The vibration of the notes activate a chakra and through the nadis emanating from the chakras, the organ at the side of the disease begins the healing process. Sri

Swamiji employs different ancient sciences like astrology, gemology, astronomy, herbology, science of mantras, chromo therapy, crystal therapy, Ayurveda, etc in the healing process.

Through his intuitive powers, along with decades of personal and clinical research has correlated the 72 ragas of the melakarta system with the chakras, elements, nadis, planets, astrology, signs, etc. This knowledge has profound implications on the therapeutic aspects of music from an Ayurvedic perspective.

Sri Swamiji has also identified the prabhavas of many ragas. Below are some examples of this information.

CHAKRARAGA

Muladhara Raga Vagadhisvari
Swadistana Raga Kanakanji
Manipura Raga Vachaspati
Anahata Raga Curukesi
Visshuddha Raga Gaurimanohari
Ajna Raga Kamvardhini

PLANERAGA

Sun Harikambhoji
Moon Vanaspati
Mars Kamavardhini
Mercury Chakravata
Jupiter Kosalam
Venus Dhamavathi
Saturn Natakapiya

RAGAS

Aries(Mesha) Lathanqi
Taurus(Urishabha) Vachasoaf
Gemini(Mithura) Kirvani
Cancer(Kamataka) Dhamavati
Leo(Lion) Kalqani
Virgo(Kanga) Shanumukhapriya
Libra(Tula) Racavardini
Scorpio(Vrischika) Natak Bhairavi
Saccittarius(Dhanu) Dhamavati
Capricorn(Makara) Ganamurthi
Aquarius(Khumbha) Samsanqi
Pisces(Meena) Charukesi

Carnatic RAGAS

BENEFITS

Ahir Bhairav

Gives free relaxed feeling and mitigates dust allergies and skin disease. Good for arthritic conditions

Amrutavarshini

Ushana vyathi nasini (alleviates diseases related to heat)

Ananda Bhairavi

Supresses stomach pain in both men and women. Reduces kidney type problems. Controls blood press

Bagesri

Helps in attaining Guru's grace

Bhairavi

Reduces anxiety, pressures, skin, disease, allergies

Bhupala

To awaken someone out of deep sleep

Charukesi

Bhajan: Shantirastu Pushtirastu

26th raga in the melakarta scale (parent) of the south Indian classical music. Rejuvenates the mind help

Desh

The suppression of the senses releases a negative force. The process of sublimation needs a spiritual p

Dwijavanti

Quells paralysis and sicorders of the mind

Ganamurte

Helpful in diabetes

Hansadhwani

Energy giving. Provides good thinking, chaitanya. Sarvarogaharini (panacea)

Hemavati

Bhajan: Sambho Samba

Good for joint and back pain

Kindolam

Improves digestive power. Cures stomach related diseases.

Kalyani Bhajan: Jai Jai Ganapathi

Gives energy and removes tension and acts as general tonic. Dispels the darkness of fear; Gives mother

Kapi

Sick patients get over their depression, anxiety. Reduces absent mindedness

Karaharapriya

Curative for heart disease and nervous irritability, neurosis, worry and distress.

Kedaram

Gives energy and removes tension

Keervani

Promotes dhyana (meditation) at mental and physical levels

Kokilam

Helps to prevent stone formation, burning sensations, sleeplessness and anxiety.

Madhuvarshini

Good for nerves. Cures diseases like slight headache, sleeplessness, and sinus problems.

Madhyamavati

Clears paralysis, giddiness, pain in legs/hands, etc. and nervous complaints

Malaya Maruta

To awaken someone out of deep sleep

Maya Malava Gowla

Counters pollution. It can be called the Gateway to Carnatic music. The history of Carnatic music says th

Bhajan: Inner Self

Mayamalava gowla. This raga has the power to neutralize toxins in the body. Practicing it in the early ho

Mohana Bhajan: Ishapathisha

Mohana is present where beauty and love coexist. It filters out the ill-effects of kama (desire for sex) , kr

Neelambari

To get rid of insomnia

Ranjani

Cures kidney disease

Rathipathipriya

Adds strength and vigor to a happy wedded life. This 5-swara raga has the power to eliminate poverty. T

Rohini

Cures back pain, joint pain, etc.

Sama

Makes mind sober, tranquil, induces good sleep. Good for world peace.

Saramati Bhajan: Concert in Berlin

Elevates from depressed state. Cures balagraha dosham in children (undiagnoses crying and imitability)

Sindu Bhairavi

Removes sins and sorrows and saves from unforeseen events

Sivaranjani

Powerful raga for meditation; bestows benevolence of God. Removes sadness, ushana roga santi (disea

Sandhya Kalyani

Cures ear, nose and eye diseases. Relieves chronic clods. Gives good sleep and freshness

Shankarabharanam

The power of this raga is incredible. It cures mental illness, soothes the turbulent mind and restores peace

Shanmugapriya

Sharpens the intellect of the singer as well as the listener. Instills courage in one's mind and replenishes

Subhapantuvarali

Alleviates mental dilemmas and indecisiveness

Suddha dhanyasi

Remover of sorrows. Gives a happy feeling. Tonic for nerves. Cures rhinitis and migraine.

Suruti

Mitigates stomach burn, insomnia, fear, disgust

Vakulabharanam

Alleviates asthma, bronchitis, heart disease, depression, skin disease and skin allergy

Varali Bhajan: Nakam Vinayakam

Varali is good for vayu tatva, heart, skin ailments and gastric problems.

Vasanta / Vasanti

Controls high and low blood pressure, cures heart as well as nervous diseases. Can clear the fog of confusion

Vasantham

Cures paralysis

Viswambari

General tonic, acts quickly

Yamuna Kalyani

Gives freshness and dynamism

Sri Swamiji says "The power of vibrations connects in some manner all things and all beings and all beings in the universe on all plants of existence. Nada vibrations work through the chord of sympathy existing between man and his surroundings.

The human body has 72,000 astral nerves (Nadis) which incessantly vibrate in a specific rhythmic pattern.

Disturbance in their rhythmic vibration is the root cause of disease. The musical notes restore their normal rhythm, there by bringing about good health. Listen with your heart and not your intellect"*****

He goes on to say, "Ragas like bhairavi, kalyani, vasant, kosala, hanurma thadi, hamsadwani, kirvani, etc, are the unspoiled sounds of eternal nature, the soul of man and paramatman. Whether melakarta orjanya, ragas are all energetic indeed. Potential exists in all ragas to cure conditions or afflictions. The musical healer will have subtle psychological conceptions of ragas at an intuitive level. It is not mechanical performance of ritual with the intention for material reward. Music therefore is an experience of Truth in spite of intellectual interpretation."

In addition to knowing what ragas to play for a particular ailment, and which notes in that raga to emphasize for their healing effect, which chakra and elements to emphasize as well as the influence of the planets and their raga relationship, it is of paramount importance to know what musical sound or sounds to use and the effects on the body and mind. It is for this reason that Sri Swamiji uses a synthesizer for his healing and meditation music. The five elements each have particular sounds associated with them and this knowledge adds another layer to the healing methodology.

SOUND AND THE FIVE ELEMENTS

EARTH

The earth has various aspects of beauty as well as variety in its sound. Its pitch is on the surface, its form is crescent-like, the sound of earth is dim and dull, and produces a thrill, activity, and movement in the body. All instruments of wire and gut, as well as percussive instruments such as drums, cymbals, represent the sound of the earth.

WATER

The sound of water is deep. Its form is serpent-like, and it is best heard in the roaring of the sea, the sound of running water, of mountain hills, the drizzling and pattering of the rain, the sound of water running from a pitcher into a jar, from a pipe into a tub, from a bottle into a glass. All of these sounds have a smooth and lively effect, and a tendency to produce imagination, fancy,

dream, affection, and emotion. The instrument called Jalataranga of Chinese water bowls have a touching effect on the emotions of the heart.

FIRE

The sound of fire is high-pitched and its form is curled. It is heard in the falling of the thunderbolt and in the volcanic eruption, in the sound of fire when blazing; in the sound of crackers, rifles, guns and cannons. All these have a tendency to produce fear.

AIR

The sound of air is wavering and its form is zigzag. Its voice is heard in storms, when the wind blows and in the whisper of the morning breeze. Its effect is piercing and sweeping. The sound of air finds expression in all wind instruments made of wood, brass, and bamboo. It has a tendency to kindle the fire of the heart. Krishna's flute is the classic example. The air sound overpowers all other sounds, for it is living and in every aspect its influence produces ecstasy.

ETHER

The sound of ether is self-contained and it holds all forms and colors. It is the basis for all sounds. Its instrument is the human body because it can be audible only through it. Although it is all pervading it is unheard. It manifests to man as he purifies his body from material properties. The body can become its proper instrument when the space within it is opened, when all the nadis are purified. Then the sound which exists externally in space becomes manifest inwardly also. Ecstasy, illumination, restfulness, joy and revelation are the effects of this sound. This sound only elevates those who open themselves to it by the sacred practices of the yogis.

CREATING A RAGA

Many factors go into selecting and rendering a raga for a particular ailment or person or audience. Modern technology has served raga creation, as the use of the synthesizer allows any number and qualities of sounds to be used to augment or buffer the elemental qualities of the given raga. The basic pathway to disease treatment through raga is as follows:

Raga à elements à chakras à nadis à organs à disease

Here is an example of how this pathway works:

Raga Kirvani is the 21st raga in the Melakarta, and has earth as its predominant element. This means that it resonates primarily with the Muladhara chakra and has a prabhava for joint and back pain remedy. How the raga is rendered and what sounds of the synthesizer are chosen to support it affect the different nadis emanating from the Muladhara chakra.

- 1 Muladhara Chakra The base of the spine and the earth element 600 times in the course of one breath
- 2 Svadhishta Chakra and the 60 nadis of water and vitality 600 times in the course of one breath
- 3 Manipura Chakra The navel and the 60 nadis of fire are joined to this chakra
- 4 Anahata Chakra the heart and the 60 nadis of air are joined to this chakra in the course of one breath
- 5 Visshuddha Chakra and the 60 nadis of space and ether 1000 times in the course of one breath
- 6 Ajna Chakra the point between the eyebrows 7000 times in the course of all the breaths
- 7 Sahasrara Chakra crown of the head and transcending all elemental influences

USING RAGAS IN TREATMENT

The potential applications of Raga Ragani Vidya are tremendous. Presently, Sri Swamiji is giving large public concerts and producing CDs for home use. There is also a lot of research into clinical trials of Raga Ragini Vidya at SGS Ayurvedic Hospital in Mysore, India. I am excited about researching further possibilities into this science here in the West. Some interesting possibilities include ambient music, utilizing the qualities of the ragas, use of appropriate ragas during bastis, shirodhara, abhyangas, etc. The use of raga within an ayurvedic treatment is similar to the use of herbs, aromas, gemstones, etc., in the sense that the practitioner must have 1) knowledge and understanding of the raga's qualities and prabhavas to prescribe them in the proper manner, 2) understanding of the qualities and conditions of the patient and how best to balance the patient, 3) a firm understanding of the elemental basis of each raga and which chakras it affects. The ragas work through the process of entrainment (explained earlier) to soothe the nadis related to the chakras affected. Specific nadis are related to specific organs, srotas, etc, and a good understanding of the prabhavas of the ragas is key to targeting specific ailments. This is very similar to herbology, where one needs to know the herb category, what dhatus it affects, what srotas it works through, etc.

Raga therapy is especially effective on the nervous system, majja dhatu and manovaha and majjavaha srotamsi. There are many applications for use in Ayurvedic therapies. For example, music can be played in the background as support or reinforcement of a number of matching therapies such as asana and meditation. Also, music can be played at night before bed as an aid to relaxation and prevention of insomnia.

One of the most powerful uses is when working directly with the chakras and / or nadi systems in ayurvedic therapies such as chakra bastis and marma therapies. Like a support or assisting herb in a formula, proper use of ragas can accentuate the healing qualities of the any ayurvedic therapy while calming the mind of the patient.

An important element of using raga in the ayurvedic therapies context is that it requires concentration on the part of the listener. With the concentration of the listener engaged in following the development of the raga, the mind is focused and calm, which in and of itself is an important component of the healing process. So much of the nidana of majjavaha and manovaha srota related diseases are due in part or whole to the lack of focus, overwhelm, and stress. Concentration on a musical raga is much like a meditational practice, and serves the music in working more deeply and effectively.

In my own personal experience, I have successfully felt the therapies of abhyanga, rmarma and various chakra bastis enhanced by using appropriate raga for those chakras and nadi systems.

There are numerous possibilities for further research, experimentation, and application of raga ragini vidya therapies in the field of Ayurveda and I look forward to watching this development in the coming years of my own practice.

Bill Osmer December 2006

* 'Music and Musical Thought in Early India, " Lewis Rowell, 1992; "An Anthology if South Indian Classical Music," Dr. L. Subramanian, 1988; "Invitation to Indian Music, "Sakuntala Narsimhan, 1985

** The Ear and Language," 1996 pp 191-192

*** "*The Power of sound*", Joshua Leeds, 2001, p260

**** "Sonic Entertainment" Jonathon Goldman, 1994

***** From interview with Sri Ganapathi Sachchidananda Swamiji in "*The Hindu*," "Music Gives the Healing Touch: October 29, 2004

***** From interview with Sri Ganapathi Sachchidananda Swamiji in "*The Hindu*," "Music

Extends the Healing Touch)" February 10, 2006

v. BIBLIOGRAPHY

Berendt, Joachim-Ernst, "The World of Sound," 1983

Campbell, Don, "Music, Physician for Times to Come," 1991

Frawley, David, "yurvcda and the Mind," 1996

Goldman, Jonathon, "Healing Sounds" Johari, Harish, "Chakras, Energy Centers of the Transformation," 2000

Leeds, Joshua, "The Power of Sound," 2001

Narasimhan, Sakuntala, "Invitation to Indian Music," 1988

Rowell, Lewis, "Music and Musical Thought in Early India," 1992

Sri Ganapathi Sachidananda Swarniji, "Kriya Yoga," 1990

"The Ragas of South India," 1976; "Kriti ManimaJa," 2002

"Nada Mantapa," 1998

Subramanian, Dr. L., "An Anthology of South Indian Classical Music," 1988

Swami Sadashiva Tirtha, "The Ayurvedic Encyclopedia Tomatis, Alfred, "The Ear and Language," 1996

Zysk, Kenneth G., "Medicine in the Veda," 1996