

ATUM TO ATOM

BOOK 1: MUSIC AND COSMOKRATOR

Asia Shepsut

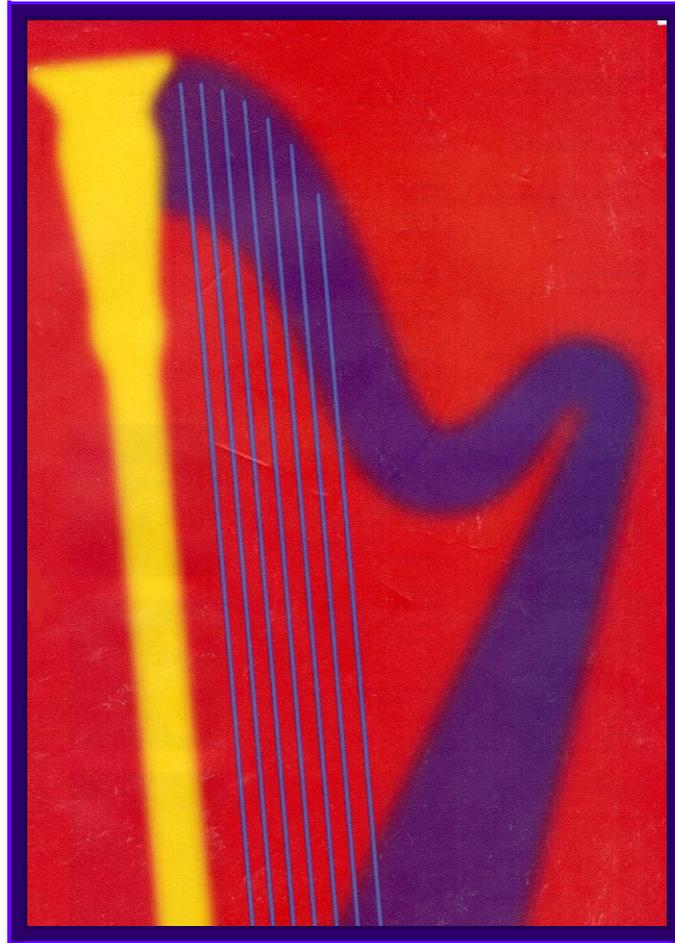


2010

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Currently consider the connection of all things, in themselves and their relation to one another. For in a manner all things are implicated with one another and all in this way are friendly to one another, for one thing comes to order and this is by virtue of all the active movement and mutual conspiracy, and the unity of substance.

*Marcus Aurelius, Roman Emperor, writing in the First Century AD,
and still a best-seller in Penguin paperback*



Frontispiece: The traditional seven-stringed harp, variant of the ancient lyre

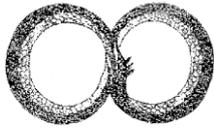
PRINTING INSTRUCTIONS

This book is formatted to print onto A4 pages as loaded on any ordinary colour printer: the pages can then be slid into a plastic spine of appropriate width, purchasable from stationery shops - or bound into ring-binder or glue-bound covers if you have access to an office brochure binder.

Suggestions for inclusions, amendments or corrections are welcome, and should be sent to the contact names on the www.cosmokrator.com Feedback site.

Title and Contents pages: The Ouroboros Symbol

The *Ouroboros*, or snake eating its tail, represents the seamless continuity of the Universe, the reality beyond the illusion of a beginning and end. In the present book it stands for the meeting of Ancient with Modern knowledge, and encapsulates the idea of recurring octaves, or cycles - *the one on the title page is taken from an Alexandrian Gnostic manuscript with the Greek inscription 'All is One', whilst the ouroboros on the Contents Page is twisted into the symbol for infinity*



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THE OCTAVE: VEIL OF ISIS

Sound and number

Key numbers: 1 2 3 4 5 6 7 8

*From harmony, from heavenly harmony
This universal frame began.
When Nature underneath a heap
Of jarring atoms lay,
And could not heave her head,
The tuneful voice was heard from high:
"Arise, ye more than dead!"
Then cold and hot and moist and dry
In order to their stations leap,
And Music's power obey.
From harmony, from heavenly harmony
This universal frame began;
From harmony to harmony
Through all the compass of the notes it ran,
The diapason closing full in Man.*

[John Dryden A Hymn to Music for St Cecilia's Day 1687, 1st verse]

Dryden's poem suggests not only that music created the world, with mankind as its crowning octave, but also that sound will *undo* the world when it is time for it to be folded back to its beginnings, spelt out in the last four lines of Dryden's poem:

*This crumbling pageant shall devour,
The trumpet shall be heard on high,
The dead shall live, the living die,
And Music shall untune the sky.*

Vibration, creative or destructive, is the prime agent of the turning unity that is our universe, and we all know how the radiation of an atom bomb dismantles substance in seconds, due to its fast resonance being out of tune with the more static structures of fixed matter. Or electricity is generated by rotating turbines with blades which are shaped and turned at a speed which ties in with a well-worked out formula of harmonics that all engineers learn. If the blades are the wrong shape or are run at the wrong speed they gradually break up, as an engineer explained when problems occurred in one such turbine:

The stage 3 blade operates between the 6th and 7th nodal diameter harmonics of the first mode and the effect of the change was to give an increased margin on the 7th nodal diameter harmonic during under-frequency operations, at the expense of a reduced margin on the 6th nodal diameter harmonic during over-frequency operations. On inspection of the turbine it was found one stage 3 blade in the rear flow had failed and detached from the rotor. The manufacturer recommended that the damaged turbine be rebladed with blades of the original design and this was agreed with the customer.

How much more do the harmonies and dissonances of vibration affect human society and the way it lives! That is why this book is absolutely crucial for understanding the nature of music and why it is literally a matter of life and death that we live by music that keeps the spirit alive, rather than allowing young generations to be seduced by destructive sound

that ravages souls, exposing our children to the barbarism of sounds that work only on the perverse aspects of the lower chakras! We can no longer afford to be tolerant of those tendencies in human society which shred healthy auras and lead people to exist on limited versions of themselves where even the few chakras they use are sick. Sound and music form a continuum, as we find in the following incident:

I met Michael at work. We are shift engineers at a Farm Services fertiliser plant... There have been no accidents in six years and we have the best record of [ammonia] leak detection in the State. We make a good team... Last night, Michael brought an expensive bottle of wine for dinner that he had gotten in Kansas City, and I served home-made cannelloni. The pine nuts alone cost me eight dollars a pound. We didn't have much to say to one another. When the wine bottle was about a third full, Michael picked it up to refill our glasses, but instead of pouring anything out, he blew across the rim of the bottle. Then he poured some in his glass and blew across it again. I find this sort of thing tedious, so I held my hand out with a put-upon air. He poured some into my glass. I made a face. He blew again and said, 'Wait a minute'.

'For what?'

'An idea'

'Personal or professional?'

He blew again, then he said, 'Don't you have an old recorder or something around here?'

'It's on the mantel.' He brought it to the table and began blowing into it, covering holes. Then he handed it to me and said, 'Play a note'. I played G.

'Hmm.'

'What's the idea?'

'Why, couldn't you tell whether there was a leak in a pipeline by the pitch of sounds going through it?'

'You mean the ammonia pipeline?'

'Or natural gas. Any pipeline. Blow another note. Put all your fingers down and lift one finger off at a time.' I played C, D, F on up the instrument. He said, 'You could even tell where it was, if you had the proper acoustic equipment'.

'And you wouldn't have to turn off the pipeline to locate it, only to fix it. The pitch would locate it'. I sat up and smiled. This was why Michael and I were together. 'And you wouldn't have to send any special sound through it. In fact, you could test it regularly with just the pumping noise as your sound. You could rig up a computer program that would test it automatically, every thirty seconds'.

'What if it were a branching pipe?'

'The branch would act as another leak. It would just change the baseline pitch'.

[Jane Smiley 'Dynamite' in her collection of short stories, The Age of Grief London 1988]

Everyday stable life is sustained by vibrations that are musical, and when things are working properly, violent change is the result of shattering the normal intervals between notes. Everything has its music, from the molecular structure of horse haemoglobin (Book 5) to the mating vibrations of mosquito wings (Book 6) (BBC Focus Magazine has a website www.focusmag.co.uk where you can log on and listen in to some of the amazing sounds of nature going on at very high (or very low) frequencies around us, collected by Luis Villazon.) The modern-day emphasis on life as one long crisis is caused by media bias, for the greater percentage of ordinary life, ticking over normally according to rhythmic cycles, is a smooth process of one sunrise after the other but not considered newsworthy (the

Rigvedic Hymns celebrate them dawn by dawn, aeon after aeon). What holds human life together are traditions and rituals that hold humanity together - the adventure of maintaining harmony lies at the root of all the great stories of human life.

All the Cosmokrator books show how it is *norms* that we should try to understand, *as well as* their dissonant exceptions which in milder forms are actually necessary to keep cycles spiralling, instead of repetitively circling! Dryden's musical model for the structure of the universe is a more beautiful idea to use as a pattern for life than trying to live by the chaotic explosions and fusions of 'The Big Bang of Creation' mythology espoused by scientists today. Neither view is invalid: both are true contributions toward understanding the process by which we reached our present position, surrounded as we are by a bewildering torrent of phenomena, information and events which may not seem connected. For overall balance sometimes it is important to step off the roundabout of World News bulletins and look at natural phenomena round us, ticking over innocuously as they have been doing for millions of years. It is too much for one individual to perpetually bear the troubles of the world on their shoulders - we should be allowed to hang them up like a cloak on the door and take a rest to revel in the natural harmonies of art and nature, regularly! This was the underlying purpose of keeping the Sabbath, every Seventh Day.

Alice Bailey believed the study of sound and the effects of music would put into mankind's hands an instrument far more powerful than it has had hitherto. 'Through the use of sound the scientist of the future will bring about his results; through sound a new field of discovery will open up; the sound which every form in all kingdoms of Nature gives forth will be studied and known and changes will be brought about and new forms developed through its medium:... the release of energy in the atom is linked to this new coming science of sound'. Interestingly, the daughter of Greek Earth Goddess Demeter/Gemeter, which literally means 'Earth Measurer' is Persephone who languishes in the Underworld of Silence half the year. Ponder her name, which means 'By Means of Sound'.

LISTENING TO SOUND AND MUSIC

Apart from bringing evidence together from many different realms in our books to support the idea that our lives are woven on webs of resonance at all wavelengths, as mentioned in Book 0 we will stop to make suggestions to the reader for activities through which to test by their own experience the perennial ideas we put forward. *Our first suggestion is that you watch your own reactions to music, noise, and sounds in general.* To give you an idea of what this is about, here is Brian Keenan's description of a spontaneous and unexpected altered state of consciousness (ASC) he experienced while imprisoned, much like Persephone in the Underworld, as a hostage in Beirut:

I knew they had a motor generator to light the prison at night whilst bringing in new prisoners. On one occasion the generator was running, though there was no light, and the ventilation pipe was blowing in dusty hot air as usual. I remember listening to the noise of the machine and the air as it passed through the long vent of piping. My mind seemed to be pulled into the noise until the noise became music. And I listened entranced in the dark to the music that was coming from this pipe. I knew that there was no music and yet I heard it. And flowing out melodiously was all the music that I had ever loved or half remembered. All at once, all simultaneously playing especially for me. It seemed I sat alone in a great concert hall in which this music was being played for me alone. I heard the ethnic music of Africa. The rhythmic music of bone on skin. I heard the swirl and squeal of bagpipes. I heard voices chanting in a tribal chant; great orchestras of violins; and flutes filling the air like bird flight, while quiet voices sang some ancient Gregorian chant. All the music of the world was there, playing incessantly into my cell. I lay at first smiling and listening and enjoying this aural feast. I kept telling myself, 'There is no music, Brian, it's in your head'. But still I hear it and the music played on and on, ever-changing, ever-colourful. I heard the Uilleann pipes' lilting drone. I heard fingers strum and pluck a classical flamenco. I heard ancient musics of ancient civilisations coming all at once to fill my cell, and from simply smiling and laughing I fell into a musical delirium and began to tap and dance and beat softly upon the walls the different rhythms offered to me.

For how long I did this, I cannot tell, but then suddenly I was fearful. This music that was not there but that I heard¹ had taken hold of me and would not let me go I could not silence it. It was carrying me away. I called for it to stop. I pressed my hands over my ears foolishly trying to block out a music that was already thumping in my head and it would not go away. I could not end this or silence it. The more I tried the louder it swirled about me, the more it filled the room. And in its loudness I was gripped with a fear that was new to me. I did not know how to contain myself or how to end this thing. My fight against it was defeating me. It was crushing out every part of me and filling me with itself. I could not bear it.

I fumbled under my mattress to find the stubs of candles that I had squirrelled away. I took out one candle and lit it in the hope that light would dispel the music that filled the room, but it did not. With my mind only half-conscious, I lit another and another candle until I had filled the cell with candlelight, bright, dazzling, soft, alluring light. But still the music played round me. Everywhere the bright burning of the small candles and me waiting and hoping that this imagined music would stop. And then I remember again you do not overcome by fighting, you only concede the victory to the madness within. You overcome by going beyond it.

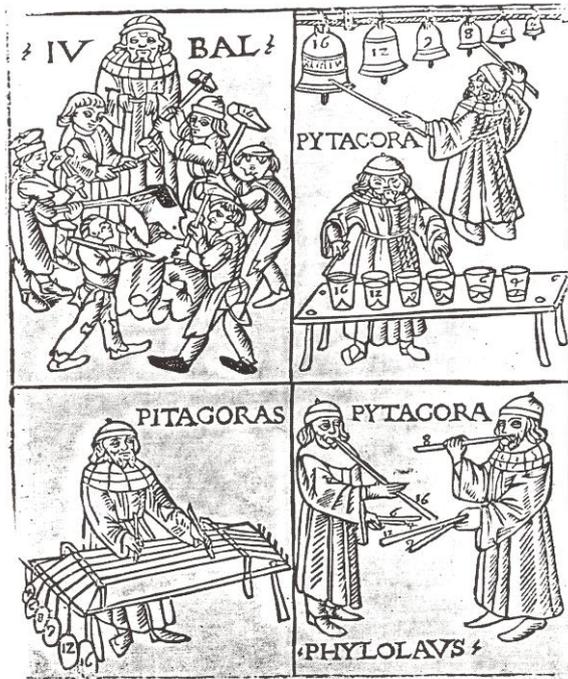
Like a somnambulist, I got up from my mattress and in that tiny cell, naked and wet with sweat, I began to dance. Slowly, slowly at first then going with the music, faster I danced and faster until I went beyond, and beyond the music's hold on me. I danced every dance I knew and dances unknown to me. I danced and danced until the music had to keep up with me. I was a dancing dervish. I was the master of this music and I danced and danced. The sweat rolled off me and I bathed myself in the luxury of it. I felt myself alive and unafraid. I was the pied piper who was calling the tune. A tiny cell, a dozen candle stubs and a madman dancing naked. I was laughing. The laughter was part of the music around me. Not the laugh of hysteria, but the laugh of self-possession the laugh that comes with the moment of victory. Every part of me, every limb, every muscle energised in this dance. For how long I danced or how long I laughed I cannot tell. But it seemed that I would be dancing forever.

[Bryan Keenan An Evil Cradling London 1988]

This behaviour is akin to the ritual Bacchic abandon to dance as practised in ancient Greece in honour of the Great God Pan - a phasing into concordance of body with the of the grand cosmic rhythm (see such a dance to Pan in Poussin's painting, in Book 10). How

¹ Very low notes, as created by long organ pipes, are sometimes so deep that they are not always consciously heard. This is infra-sound and has sometimes been thought to bring about 'religious feeling' or 'sensory phenomena suggestive of a ghost' (Christopher Wood in *The Times Higher* 6 Dec. 2002). The entire universe, including we on planet Earth, are bathed in the after-echo of the Big Bang which we do not consciously hear - yet if taken away we would be annihilated on the spot.

remarkable that the primordial instinct broke out for a hostage in extreme conditions. Keenan and Pythagoras would have understood each other, for it was Pythagoras who, listening to passing sounds of struck metal and plucked string, formulated a Greek version of the laws of music that in themselves are as old as mankind - indeed as the universe.



Ill. 1 - 1: Woodcuts from Gafurio's *Theoria Musica* (1492) illustrating the recognition of the laws of music through struck hammerheads of differing size; pinged glasses filled with different levels of liquid, strings of varied lengths plucked, and pipes of different lengths blown - by Tubal Cain, Pythagoras and Philolaus

These laws are far more ancient than Pythagoras, who inherited a prehistoric Atlantean tradition. Lyres have been shown by Anne Macaulay to have been part of Druidic Stone Age Britain, named by the ancient Greeks 'Hyperborea' and cited by Diodorus Siculus as Apollo's original home.

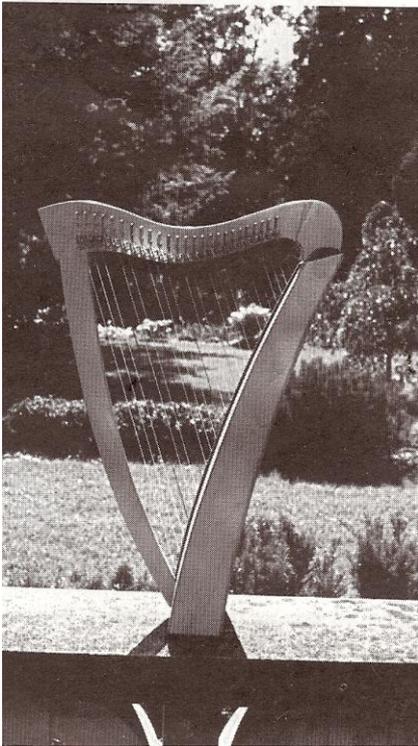


Ill. 1 - 2: Restored Harp from Ur - British Museum

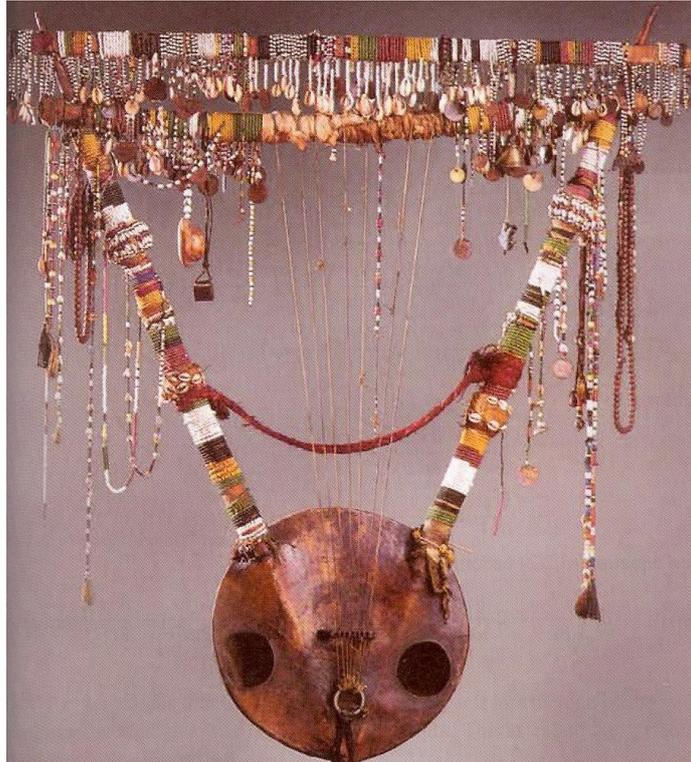


Ill. 1 - 3: Gold and Lapis Lazuli Bull head on the sounding box

In the ancient near east, lyres and harps from 2500 BC were found in the Ur burials to sound the voice of the Bull of Heaven and were still in use in the Sudan up to recent times.



Ill. 1 - 4: A modern-day Celtic Harp, to which are related the violin, guitar and piano



Ill. 1 - 5: A late 19C lyre from Nubia – British Museum

If we come back to our own music listening, these days our predominant intake can be a *digital* array of pop, classical, ethnic and electronic, with more music being discovered from the past or created in the present from all over the world expanding choice *ad infinitum*. Thanks to sophisticated listening devices, never has access to such a variety of music (*Per-se-phone*) been more available to the man and woman in the street at any time of the day or night. But at times one wonders whether discrimination has not at the same time been lowered when a large part of the population seem to wish to anaesthetise themselves, not through fine music but by deadening their soul through loudly jarring and ugly cacophony that simply irritates others in their vicinity. No-one has the excuse of lack of access to music by which to change their mood, stimulate their intellect or soar to pure spirit (*All art aspires to the condition of Music*, said Walter Pater) but, certainly in the West, discrimination about refined music has been lost by the general populace - who have even lost touch with village songs, nursery rhymes or local folk music - and attendance at a live performance of classical music is a minority activity. Later we see through Plato's thinking that this is pivotal to good or bad Government.

In fact people who really love to give themselves up to subtle overtones are willing to pay large amounts of money to hear live music on a single occasion after which the music goes back to silence for ever, unrecorded. Certainly they get more of a chance of soul

transformation that way. Berendt in **Nada Brahman: The World is Sound** describes the Ear as the first temple, since we can listen to the entire universe and its extensions through it. *We suggest you expand your horizons by experimenting with a range of music rather than repeating what you know already. With the Octave of the Chakras in mind (Ills 0-16; 0-17 and 0-20 in Book 0) try to notice which part of you responds to particular kinds of music. Are you, for instance, dwelling too much on music that excites your sex and movement centre and not enough on music that illuminates your intellect with a sense of order, or your heart with high emotion? An obvious division would be intellectual music like Bach's, -v- emotional music like Beethoven's. Take a photograph of yourself, overlay it with some tracing paper and mark in the seven chakra spots. See if you can find a record or tape that gives music to feed each of your chakras and put them on a rack as your core music collection. As you match music to your centres expand it with more tracks that appear to enhance different nodes, remembering that your spine marks out an octave in bone (explored in more detail in Book 6). Of course great music feeds several chakras at once, in which case put the recording in a final section for feeding the entire being!*

Music is, of course, Sound that is not just Noise and we are all aware of the stress caused by the loudness of present-day city and industrial environments with its grinding transport and machinery or panic-inducing police sirens. Incompatibilities between neighbours' choice of music and lifestyles is an everyday stress factor that is now part of the agenda of most town councils to try and control, for noise aggravation between neighbours has sometimes led to death: in Britain it was reported in the **Independent on Sunday** (28.12.94) that in the previous six years 17 people had died in disputes about loud music or DIY work done out of hours. The most notable were the deaths of Valerie Edwards in Bristol who died of pneumonia from sitting in the park several nights in the cold and rain to avoid the loud music of her incaltrant neighbour; of Harry Stephenson, stabbed by the neighbour he complained to about his noisy lifestyle; or of Donna Wilson bludgeoned to death with pickaxe handles by a gang called in by her neighbour after her noisy parties upset his wife with a heart condition. *Music hath charms to soothe the troubled breast*, but Noise drives people to madness, not just because it is loud, but also because it blasts all the nodal anchors of the Octave which manifest as chakras in the human body. Dissonant noise is the equivalent of the atom bomb on the harmony of our lives, at worst reducing a person to a state of total disintegration but much of the time we are just continually semi-stressed by the strife or urban noise on a long-term basis². Aware of the fact that Music and Noise stand at opposite ends of the Sound spectrum, modern

² Technology is now well developed for headphones, building insulation or speakers fitted to furniture or rooms 'which blast out an opposing din and neutralise such incoming noise as the irritating bass beats of a neighbour's favourite top ten hit' (Steve Connor, Science Correspondent, **The Sunday Times** 27 April 1997).

composers have sought to extent the limits of Music to include everyday sounds - even cacophonous noise, but this does not make it any more comfortable to listen to and in excess subverts the role of music in lifting the spirit to the underlying order of Life engendered by the Octave, unchanging and more enduring than the disorder of Noise.

SOUND, NUMBER AND MUSIC

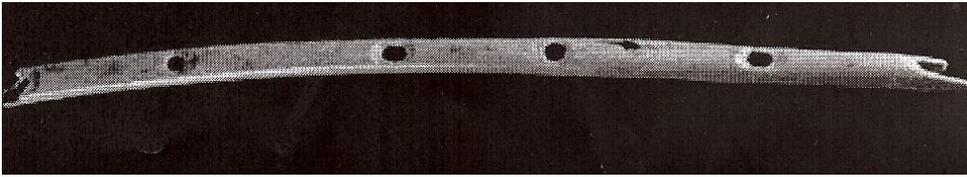
Dryden's poem to Cecilia, the Ninth Muse, sainted by Christianity, perfectly sums up the Western tradition of Music whose origins go back to ancient Greece. The story goes that one day in the Fifth Century BC Pythagoras was passing a smith when he heard the ringing of the blacksmith's hammer on metal as it struck the anvil at different notes (Ill. 1-1). Like Brian Keenan, he was at that moment spontaneously aware of these everyday sounds as musical reverberations and realised their notes were proportional to the thickness and length of the metal hammerheads used.



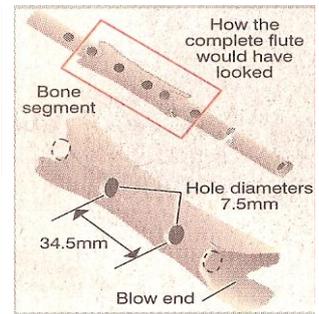
Ill. 1 - 6: Orpheus with his lyre music tames the animal kingdom – mosaic in the House of Orpheus, Paphos, Cyprus:

Pythagoras is especially known for teaching his pupils in Croton, a Greek colony in S Italy, about the direct relation between string lengths on the seven-stringed lyre (Ill.1-6) and the height or depth of note they give out when plucked (Ill. 1-25), and that their range reflects the Grand Octave of Sound that brings the Universe into being (Ill. 0-29). Pythagoras propounded the doctrine of the Lyre of Apollo, the Zodiac God, which supplanted the blown harmonies of the Pipes of Pan, primordial Nature God (Book 10) of the Neolithic.

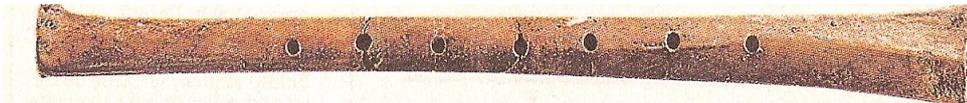
Several bone pipes, prototypes of our flutes and recorders, have recently (1997-2000) been unearthed from this period:



Ill. 1 - 7: One of three flutes found in the Hohe Fels cavern made of a vulture wing bone (the other two were of mammoth ivory) c. 32,000BC – reported in Nature June 2009



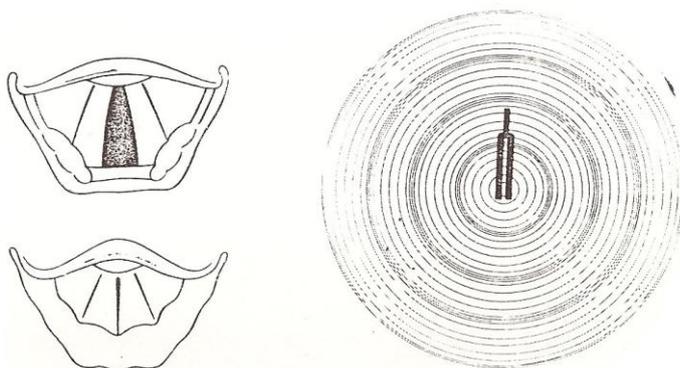
Ill. 1 - 8: Fragment of Neanderthal bone pipe of a bear thigh bone from a cave in Slovenia c. 67,000-43,000BC – The Times 5 April 1997



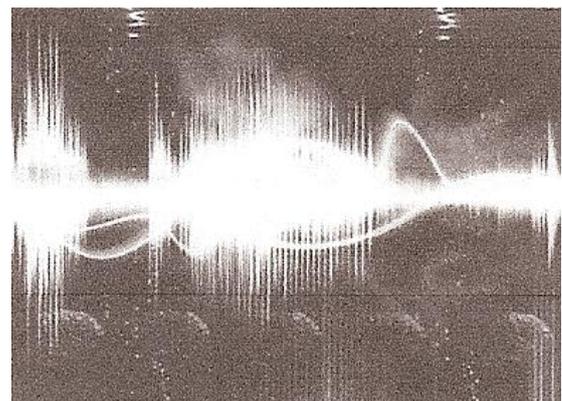
Ill. 1 - 9: A flute found in Jiahu, China, also made of a bird bone, found with 5 other perfectly preserved instruments and fragments of 30 others, c. 7,000BC – reported in The Daily Mail 23 September 1999

though so far a complete Pan set consisting of a range of 9 tubes of increasing length (one for each note in the octave) as still used by people of the Andes to this day has not been unearthed. Their differing lengths demonstrate in this case a corresponding law of the proportionality of note to length of air column, upon which any church organ is a further elaboration. This proportionality applies also to a row of glasses containing increasingly more water in them (Ill. 1-1) when struck, or their wet rim stroked in circles.

Combining with the proportionality of string lengths on Apollo’s Lyre, the human voice-box works on the same principle, whereby the vocal chords shorten or lengthen to enlarge



Ill. 1 - 10: The Larynx in vibration, and static

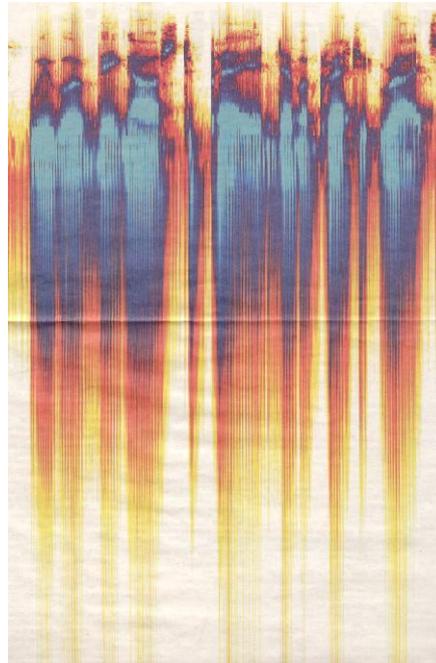


Ill. 1 - 11: The speaking voice as a set of frequencies

or restrict the air column cross-section across the wind-pipe according to the note required. One researcher³ reported that everyone emits overtones within the main frequencies of their voice that add up to a unique sound signature of that person’s character and history which can be matched even to their looks and finger lengths (she had

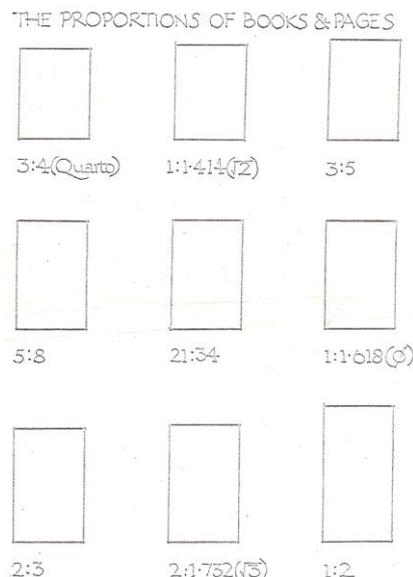
³ Susan Hughes, Assistant Professor of Psychology at Albright College Pennsylvania (BBC Focus Magazine Sept 2008)

previously noted that those with attractive voices tended also to have more symmetrical bodies). The Welsh artist Tracey Moberly transferred a sonogram based on the voice patterns of MP Tony Benn onto canvas ('You can almost see the words' she said):



Ill. 1 - 12: Painting based on the sonogram of Tony Benn's voice (The Times T2 26/05/05)

It is in a myth passed down from Pythagoras' period that Apollo's lyre-strumming at a musical contest won out over the flute-blowing of Pan's servant, Marsyas, perhaps because the string lengths provided a more clearly obvious visual translation of sound ratios into the equivalent line-lengths⁴ (much as we are sensitive to paper sizes in stationery today)



Ill. 1 - 13: Pairs of harmonious string-length ratios have often been used to determine paper sizes for books and stationery, as well as wall areas in interiors

⁴ Explored in Book 2, on Geometry

During the 8-4th centuries BC, such harmonic lengths established for the new era the ratios of temple façade construction (see Book 11) which began to spread throughout Magna Graecia⁵ (many of them temples to Apollo). The Romans used less pure canons of proportion⁶ even though based on the Greek. But it could also be said the reason for Apollo's victory over Marsyas is that not only is the resonance of strings stronger than that of the pipes, but also the change of the instrument of preference seems to have marked the start of a new Age (see *Use of Cosmokrator as a World Era Clock* on the www.cosmokrator.com website). For a brilliant insight into the master programme behind the founding of these Greek temples built mostly for the Apollo cult during the Archaic and Classical periods, Jean Richer's insights into the sacred geography of the Greek World are an eye-opener (Book 11). Let us look at the Pythagorean Octave of that same era.

THE PYTHAGOREAN OCTAVE

The first step in understanding Pythagoras' teaching is to look at the structure of the Octave and the way sound behaves. After that we can look into his profound demonstration of the correspondence of musical notes to the octaves of other material planes such as colour, shape and other seven-fold cycles, even the unfolding of events! Illustration 1-19 spells out the main notes of the octave, with notes 1 and 8 standing at both the beginning and end of any octave, 8 being also the first note of the next octave up and 0 standing for the silence before note 1 of the octave is sounded. If we are choosing Middle C on the piano (or as a sung note) as the starting point, which is the natural one by which to demonstrate Pythagoras' theory in its purest form, then on a piano, beginning at the key just next to the middle pair of black keys, the rest of the octave simply follows the sequence of white keys as 1 2 3 4 5 6 7 and 8 (Ill. 1.22).

Why not play or sing these notes now? If singing the notes of the octave, to get the right note you can either play Middle C on the piano or some other instrument, or strike a tuning fork set to resonate on that note. To start with, simply play or sing the notes of the Octave up to note 8 - nothing more nor less. You will notice there is a sense of beginning, middle and completion as you travel through it - you can also feel how the seven-note scale does not feel complete until it has reached that last note and made its transition to the start of the next plane. Heard as a whole, the sequence is a natural succession that comes to a satisfying end. So it is with events in life.

The notion here is that Pythagoras, in giving a number to each of the notes of the Octave made it possible to express relationships between notes played one after each other, or

⁵ Jean Richer, *Géographie Sacrée du Monde Grec* Paris 1983

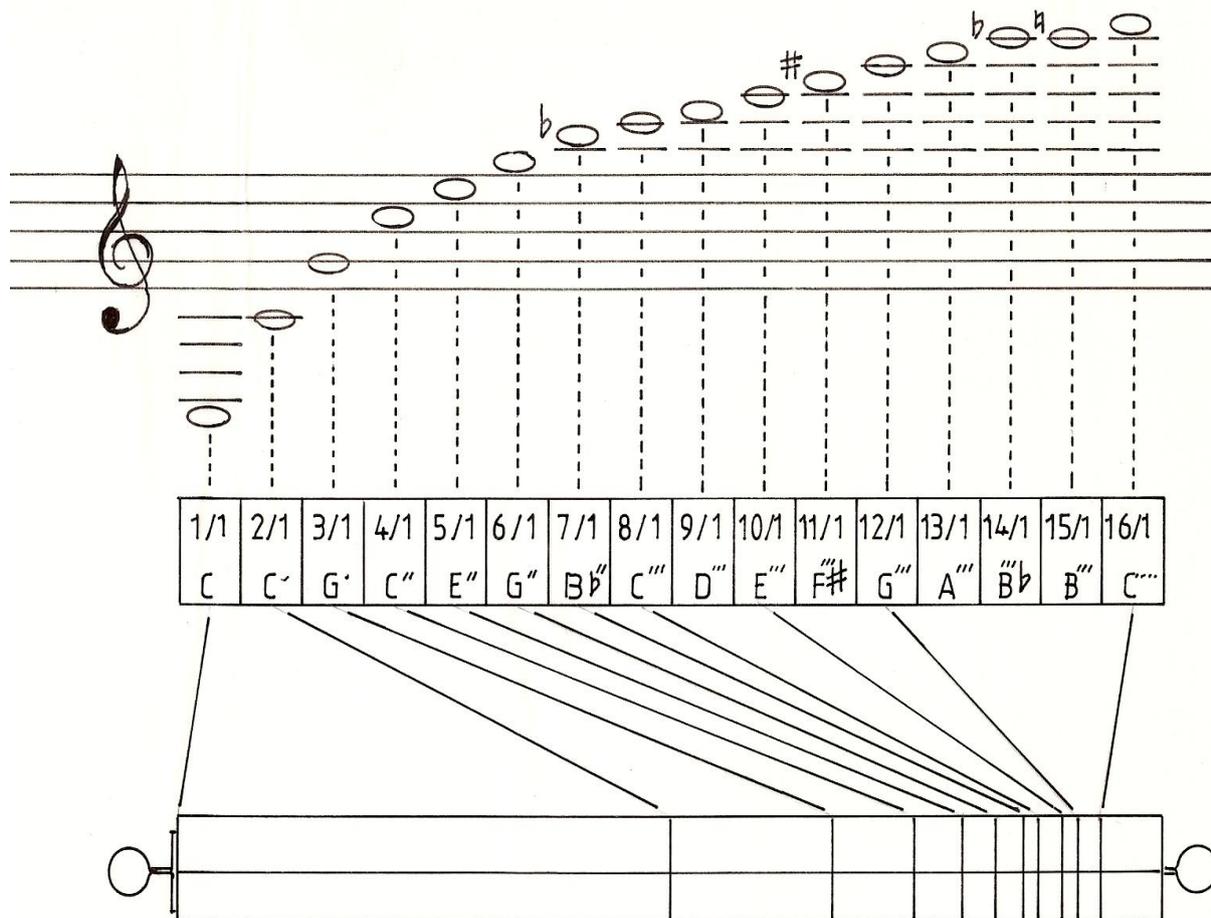
⁶ Jean Richer *Géographie Sacrée dans le Monde Romain* Paris 1983

simultaneously together, arguing that they form the bricks of the formation of the entire material world we inhabit. If I play the first then fifth notes of the octave I can write it down as 1, 5 but if I play them simultaneously I am experiencing the ratio 3:2 as we shall understand shortly when looking at the Monochord. We call the ratio Pythagorean because it was he who put on record (speaking at the end of thousands of years of the oral tradition preceding him) *why* different notes played together are harmonious or dissonant - depending, literally, on whether the numbers of their vibrations 'fit' exactly into each other, or not. With modern instruments that measure sound other sets of vibration are measured but they can all be reduced back to the Pythagorean ratios in the end, and through them we can understand down to extreme levels of minutiae how harmony works through pure Number.

That is why Music, Mathematics and Dance express each other so exactly - as Ian Stewart expressed it in his Royal Institution Christmas Lectures, 'We respond to music because our minds have evolved a deep bias towards the detection and appreciation of mathematical patterns' which 'knits a tribal culture together, making it evolutionarily worthwhile for humans to evolve the kind of mind that reacts positively to music'. I don't think we need to bring in evolution since the Platonic view is that since humans are made of musical proportion at all levels (mind, body and spirit) they will naturally recognise it: indeed in Wordsworthian terms it is likely that urban humans have evolved *away* from high music down to a much lower-grade apprehension of it as I have already lamented above! In an exhaustive and masterly exposition of the link between Pythagoras' musical scale and contemporary Greek history and philosophy McClain's **The Pythagorean Plato** gives an incredible level of detail building further on Doczi's basic diagram (Ill. 1-22), so prepare for the equivalent of climbing Everest when it comes to dealing with the numerical side (I personally would simply sit down and listen to a complex symphony instead)! In this book we take a step-by-step approach, aiming at intelligent 'beginners' who already have some sense of harmonics but need a refresher course on basics and plain numbers before moving to the complete toolkit of microtones and their implications as we do in later books.

So fundamental is the core sequence of eight notes⁷ that it is worth stopping here to spend time observing their counterparts in string length more closely. This is because it is a tangible way of understanding proportion and thence shape - and therefore the unfolding of the Cosmic Octave in the Creation (Matter), whether we understand the process as musical - or as a Big Bang sequence on the material plane only. A good way to start is to make a Monochord, although a string on a guitar or violin would do.

⁷ Usually now expressed as letters of the alphabet in the West (Ill.1-19, 2nd row), as well as by the Solfa notation used in singing which has a variation in Hindu music important to know about (Ill. 1-19, 3rd and 4th rows).

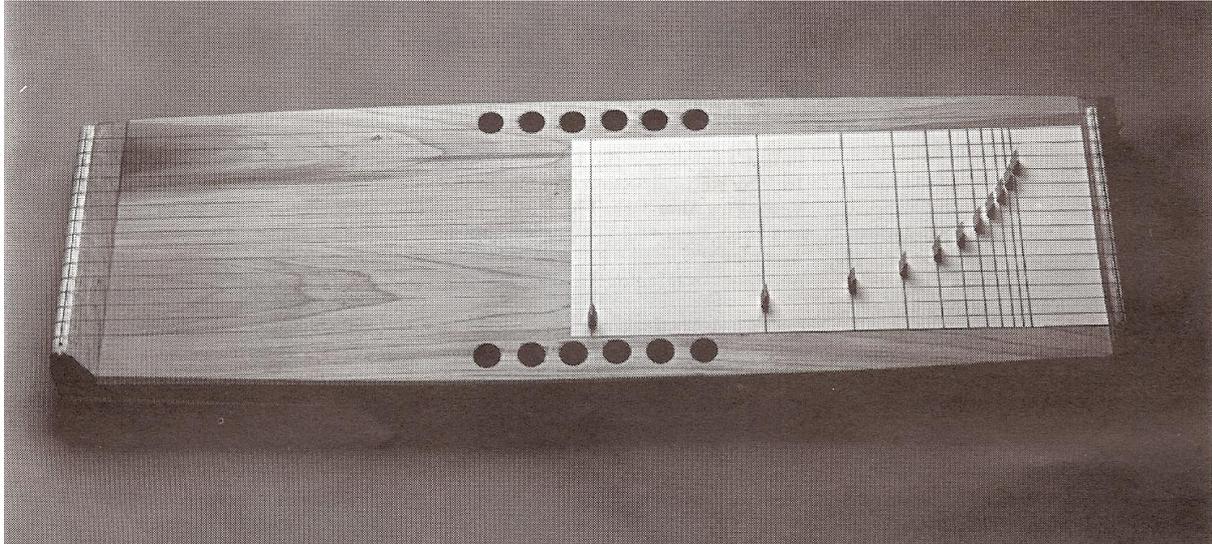


Ill. 1 - 14: A modern Monochord - these can be purchased though it is easy to make one: intervals between stops give ratios between notes (inverted, the numbers give fractions of the full length) – from Kayser’s Akroasis, redrawn by Jacqueline Munthali

THE MONOCHORD

The illustration above shows a monochord and ratios in relation to the full length of the string between stop-down points on it: notes get higher, the shorter the string length.

Whether you buy one or make one, you need to end up with a board with a gut or metal string stretched at full length along it. You need to mark in under the string some measurements but as a guide you could at the top or bottom of the board sellotape a measuring tape as used in DIY or sewing. Even better, the board could be the lid on a box which then acts to amplify the notes as a sounding box when the string above it is plucked. Practical instructions for making a very accurate monochord are given in Anne Macaulay’s *Apollo’s Lyre* but it is quite good enough if this exercise simply conveys in basic concrete terms the relationship between number, note and, in this case, string length, the nodal points being drawn on with a marker as you proceed.



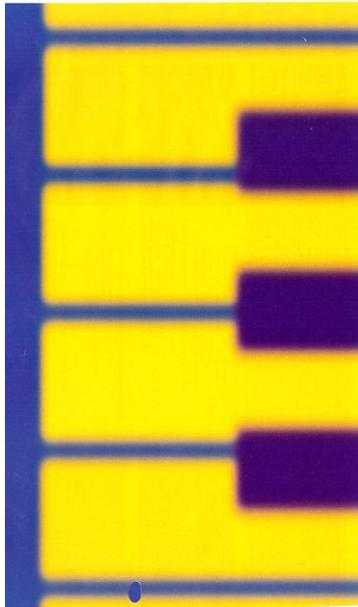
Ill. 1 - 15: Exercise board with proportionally shorter stops each marked by separate strings, creating the curve related to those in Ills 1-14 and 1-25

Pursuing Pythagoras' theories exhaustively in his book *Akroasis*, it was Kayser⁸ who made the definitive diagram of the Monochord and its harmonic divisions showing the precise note and string-length correspondences (Ill. 1-14 above). Try the exercise below, referring to the Kayser's diagram for guidance.

- *First pluck the whole string and listen to its note, noticing if you can spot the vibrating single arc the string makes in the air. Then stop down the string at its half-way point (gauged by the tape-measure fixed on the board underneath), pressing it with your finger so that it touches the wood.*
- *Pluck the half string, noting the change in note;*
- *Do this one-third along, one fourth along, and so on as Doczi illustrates (Ill. 1-22);*
- *As you pluck each new length, hear and see for yourself how the note gets higher as the section of string plucked gets shorter (or correspondingly lower as the string lengthens on the other side of the stoppage point).*
- *Simultaneously plucking the string either side of the stoppage point enables you to experience the ratio between the two parts of the string, and therefore their relation to its entire length - you will notice they are harmonic in whole number intervals, which is the doctrine of the Pythagorean Octave;*
- *Mark in the stopping points on your board as you go along.*

⁸ The German sources in this book were discovered by Maryel Gardyne, to whom this chapter owes a special debt since Kayser and colleagues penetrated deeply into the nature of the Octave in astounding detail, taking Pythagorean studies many dimensions deeper thanks to their modern-day researches.

You will naturally hear good notes and those out of true and may need to adjust the stop points on the sound-box by small shifts. Of course, in a finished instrument like a guitar, these stopping points are permanently marked by hard metal bars or frets. See if you agree: the purpose of the exercise is to match Pythagorean theory to your own physical experience, and *know* it to be true in practice! Already you are tuning yourself to perceive musical proportions everywhere around you. Below are the Greek and later Renaissance names for their ratios:



MUSICAL RATIOS AND THEIR CLASSICAL AND MODERN NAMES.

RATIO	DECIMAL RATIO	GREEK NAME	LATIN NAME	ENGLISH NAME
1 : 1	= 1.000	HOMOPHONY		UNISON
8 : 9	= 1.125	EPOGDOON	SESQUIOCTAVUS	TONE
3 : 4	= 1.333	DIETESSARON	SESQUITERTIA	FOURTH
2 : 3	= 1.500	DIAPENTE	SESQUIALTERA	FIFTH
9 : 16	= 1.777	DOUBLE DIETESSARON	DOUBLE SESQUITERTIA	DOUBLE FOURTH
1 : 2	= 2.000	DIAPASON	DUPLUS	OCTAVE
4 : 9	= 2.250	DOUBLE DIAPENTE	DOUBLE SESQUIALTERA	DOUBLE FIFTH
3 : 8	= 2.666	DIAPASON DIATESSARON	DUPLUS CUM SESQUITERTIA	OCTAVE AND FOURTH
1 : 3	= 3.000	DIAPASON DIAPENTE	TRIPLUS	OCTAVE AND FIFTH
1 : 4	= 4.000	DISDIAPASON	QUADRUPUS	DOUBLE OCTAVE

III. 1 - 16: The names for the Greek, Roman and English Harmonic Ratios/ String Lengths

However, the universe is not as simplistic as that. There are differently sounding octaves with varied effects depending on the starting note - and an octave can start from any note, some comfortably, others not quite so comfortably! They all break down into two main scale groups: major (happy) and minor (sad). The starting note determines the mood, or emotion of each octave - the Greeks called them Modes:

Modern Names	The Seven Modes of Antiquity	Ancient Greek Names
Ionian Major	$\overset{1}{\text{do}} \overset{1}{\text{re}} \overset{1}{\text{mi}} \overset{1/2}{\text{fa}} \overset{1}{\text{so}} \overset{1}{\text{la}} \overset{1}{\text{ti}} \overset{1/2}{\text{do}}$ c d e f g a b c 1 2 3 4 5 6 7 8	Lydian
Dorian	$\overset{1}{\text{re}} \overset{1/2}{\text{mi}} \overset{1}{\text{fa}} \overset{1}{\text{so}} \overset{1}{\text{la}} \overset{1}{\text{ti}} \overset{1}{\text{do}} \overset{1}{\text{re}}$ d e f g a b c d 1 2 3 4 5 6 7 8	Phrygian
Phrygian	$\overset{1/2}{\text{mi}} \overset{1}{\text{fa}} \overset{1}{\text{so}} \overset{1}{\text{la}} \overset{1}{\text{ti}} \overset{1}{\text{do}} \overset{1}{\text{re}} \overset{1/2}{\text{mi}}$ e f g a b c d e 1 2 ^b 3 4 5 6 ^b 7 8	Dorian
Lydian	$\overset{1}{\text{fa}} \overset{1}{\text{so}} \overset{1}{\text{la}} \overset{1}{\text{ti}} \overset{1}{\text{do}} \overset{1}{\text{re}} \overset{1}{\text{mi}} \overset{1/2}{\text{fa}}$ f g a b c d e f 1 2 3 4 [#] 5 6 7 8	Syntolydian
Mixolydian	$\overset{1}{\text{so}} \overset{1}{\text{la}} \overset{1}{\text{ti}} \overset{1}{\text{do}} \overset{1}{\text{re}} \overset{1}{\text{mi}} \overset{1/2}{\text{fa}} \overset{1}{\text{so}}$ g a b c d e f g 1 2 3 4 5 6 7 ^b 8	Ionian
Aeolian Natural Minor	$\overset{1}{\text{la}} \overset{1/2}{\text{ti}} \overset{1}{\text{do}} \overset{1}{\text{re}} \overset{1}{\text{mi}} \overset{1/2}{\text{fa}} \overset{1}{\text{so}} \overset{1}{\text{la}}$ a b c d e f g a 1 2 3 4 5 6 ^b 7 ^b 8	Aeolian
Locrian	$\overset{1/2}{\text{ti}} \overset{1}{\text{do}} \overset{1}{\text{re}} \overset{1}{\text{mi}} \overset{1/2}{\text{fa}} \overset{1}{\text{so}} \overset{1}{\text{la}} \overset{1}{\text{ti}}$ b c d e f g a b 1 2 ^b 3 ^b 4 5 ^b 6 ^b 7 ^b 2	Mixolydian

III. 1 - 17: The Greek Modes – from Ashton

and the Hindus call them Rāgas - a Sanskr̥t word meaning 'Colours':

these notations symbols have been devised in an attempt to give a fuller picture of

<p>prominent notes ○</p> <p>other notes ●</p> <p>'gamak' ~</p> <p>'mir' 〰</p>	<p>बिलवल</p> <p>कल्पन</p> <p>स्वमज्ज</p> <p>मेरव</p>	<p>असवरि</p> <p>मेरवि</p> <p>पुर्वि</p> <p>मर्व</p>	<p>कफि</p> <p>तोदि</p>
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They have no significance in time value. Tonic: Middle C.

Raga must have at least five notes

III. 1 - 18: The Principal Indian Ragas - from Kaufman

The variations in mood occur because the starting note still relates back to the ground note of Middle C and successive notes from it are not all in completely the same proportions to each other as in the Pythagorean Octave - as we shall see when we come to

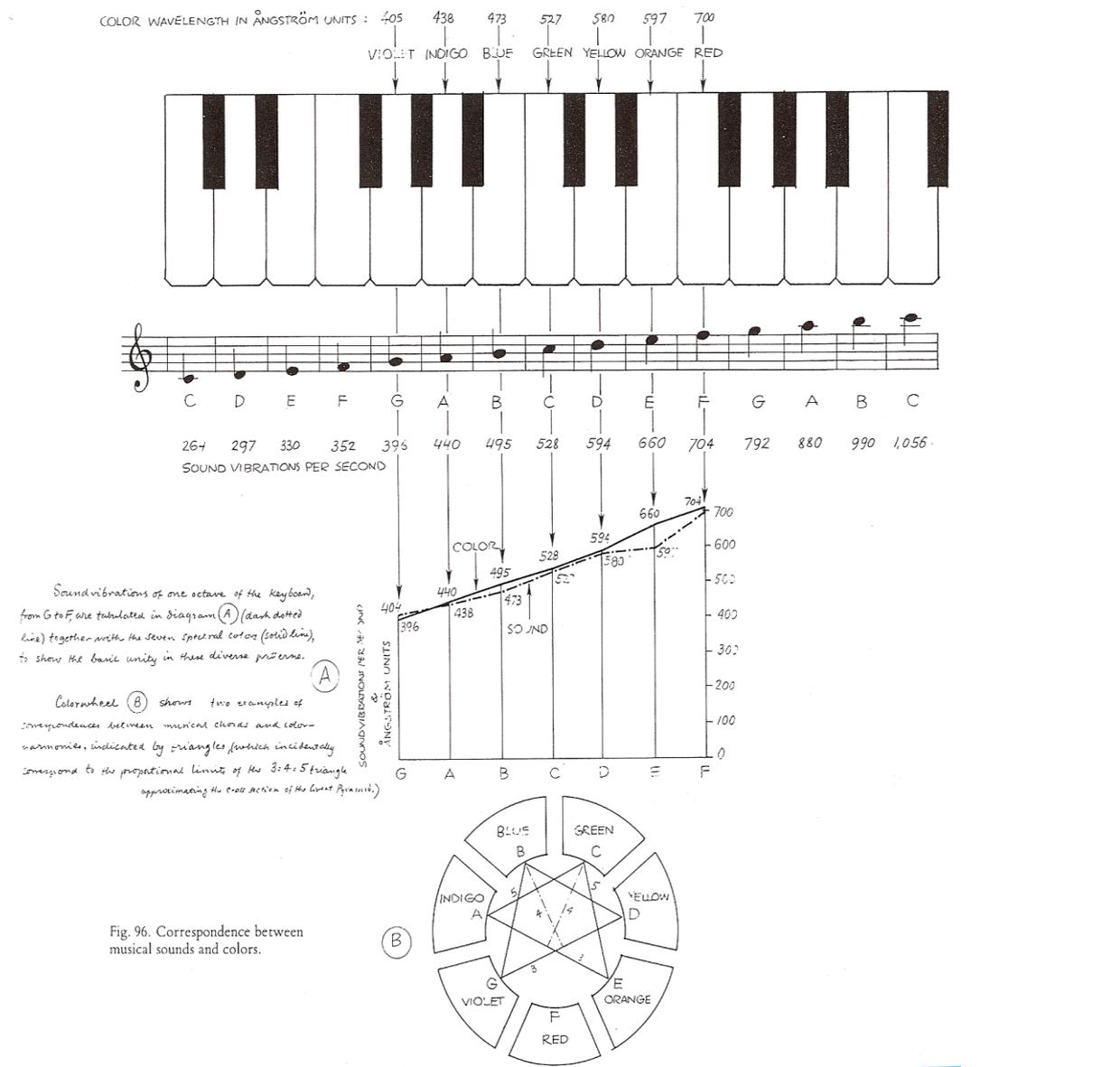
look in Book 13 at the phenomenon known as the Pythagorean Comma. For demonstration purposes, though, we shall stick to our scale starting at Middle C, the Pythagorean Octave, to look at what it has to tell us about cosmic harmony.

You and every school-child today should at least know that the notes C E G C¹ within any one octave form the ‘common chord’, or pentatonic scale which stands at the centre of the Western harmonic tradition of Apollo’s lyre, somewhat like the three primary colours in their basic simplicity, or the first shape in geometry, the triangle. This combination of notes is used in folk music all over the world as a fundamentally pleasing and innocent group of sounds - these notes are marked by notches on the chart below:

0	1	2	3	4	5	6	7	∞
Note	C	D	E	F	G	A	B	=
Solfa	Do	Re	Mi	Fa	So	La	Ti	Do ¹
Indian	Sa	Re	Ga	Ma	Pa	Dha	Ni	Sa ¹
0	1:1	9:8	5:4	4:3	3:2	5:3	15:8	1:2
Vowel	A	R (l)	E/Y	I	O/W	U	H (m)	Union with God
⊕	♁	♀	♃	♄	♅	♆	♇	♁
Day	Tues	Weds	Mon	Sun	Fri	Thurs	Sat	Week
↑ SILENCE ↓				↑ HARMONY ↓				
Day	Earth	Mon	Tues	Weds	Thurs	Fri	Sat	Week
	4	3	1	2	6	5	7	∞
Day	Earth	Mon	Tues	Weds	Thurs	Fri	Sat	Week
	4:3	5:4	1:1	9:8	5:3	3:2	15:8	1:2

Ill. 1 - 19: The Cosmic Pythagorean Octave with correspondences to Number, Colour, Vowel and Planet, with the Sun at Middle C - and below it the Material Pythagorean Octave with Earth at Middle C. The heliocentric and geocentric octaves are duals of each other by virtue of the fact that Earth and Sun (both numbered 4) stand in for each other as opposites of one axis, as do the other pairs of weekday planets, Mars:Venus; Jupiter:Mercury and Saturn:Moon – confirmed by the complementarity of their colours. This Table lies at the heart of the Seven Liberal Arts

Our chart is fundamental to the opening up into further complexity later of more detailed sets of Correspondences in the later Cosmokrator books (see also Book 7A). Note especially the colour allocations -the alignment of the series of the Colour Spectrum starting at Red parallels the Octave starting at Middle C. We must be certain these line-ups are true, and it is one icon I would draw out and colour for myself, frame and hang on the wall, so fundamental is it. Below we give Doczi's well-known version even though we disagree with his colour matches as out of tune. It is worth noting in it the first mention of numbers of vibrations per second for each note (but Doczi's numbers are *tempered*, a matter we must investigate further on):



III. 1 - 20: Colour-note vibration equivalents according to Doczi's *The Power of Limits*

So why should the arrangement given in Ill. 1-19 be any better than those put forward by others? Hundreds of books have been written on music and its connections with language,

colour and form - the Bibliography gives the best of these. The latter have contributed to checking or contributing further to our own Master Table of Correspondences, and their individual results show that it is not easy, whether relying on ancient sources, one's own deductions, or both, to arrive at a cast-iron order of colours, vowels, numbers and notes that line up with each other and *work*. The key is knowing the starting points of the scale for each medium since if one of the starting points is out of synchronisation with those of the other sequences, the weave of its entire fabric is invalidated. Nonetheless there is some cultural variation over time since mystics and teachers of many civilisations have used different combinations which worked for the bias of their society's level of awareness. Throughout this book we have chosen our line-ups according to the logic of the denominators common to the main great systems, believing after exhaustive checking that we have been successful in pinpointing the main backbone to which other sequences align. This has meant rejecting the results of some writers which do not check out (as in the instance of Doczi's illustration above). Although this may sound arrogant, all I can say is that wherever I can give good reasoning behind the ordering, I give it. It usually falls to one or two clinching linch-pins between levels which cannot be shifted out of line within their sequence which then means that everything else in the compared series must consequently take their place. This process had to be gone through after being annoyed at the arbitrary correspondences given in some hastily-written books from their hey-day in the 1960s to 1980s, even though a few of them became classics and are listed in the Bibliography! In turn you, the reader, will have suggestions for perfecting details you know about in this book: I hope you will feed them back to the www.cosmokrator.com website.

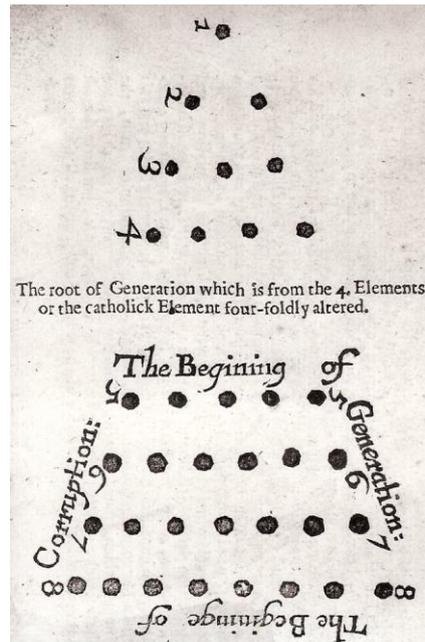
Apart from the basic correspondences of Ill. 1-19 (top) which are not difficult to agree with, the separate table underneath shows how the days of the week and their planetary rulers relate to the same seven-fold array of notes - the colours in this one moving out from the centre in pairs of complementarities (blue:orange at 6:2; green:red at 5:1; and indigo:yellow at 7:3). Having established the octaval sequence of the top table, the order in the one below was dictated by the order of the days of the week as handed down to us. There is a consequential 'scrambling' of the octaval order, so that the tables between them show a heliocentric octave in contrast to a geocentric one, indicating that notes and colours of the days of the week are not to be experienced in an ascending sequence from 1-7 as in a musical sequence but in syncopated jumps where the order of the days go by pairs of opposites - Sun:Earth; Saturn:Moon; Venus:Mars; and Jupiter:Mercury. *The complementarity of the planets and their colours is fully explained in Chapter 7 but should already have been evident in your handling of the Cosmokrator model! To test it, lock your little fingers together as the solar pivot at the centre. With your hands facing*

you, get a friend with a felt-tip pen, following the upper table, to write onto your fingertips the numbers and planets as in the table, the thumbs standing outside the octave at 0 and 8/infinity. Depending on whether you start from left or right, the wedding finger of Venus will appear either on the right hand (as for Europe) or on the left hand (as more usual) - a neat little check that the sequence in our table of correspondences is running along the right lines! In fact, looking at bronze models in any museum's Roman collection, we see they did in popular culture assign the planets to the different fingers!

What we have in the top table is the central axis of the planetary system at 4 marked by the gold of the Sun in the rainbow sequence, the gold symbolising the standard against which the others take on their respective values. However, in the lower table where it comes to applying the octave to the days of the week from the perspective of planet Earth, the factors making up the octave are reassigned according to the known order of the days of the week, handed down by ancient tradition. For this series of harmonics the Earth takes the place of Sun as centre at 4 and this time is given the colour brown. Brown has the quality of planet Earth, bathed in the entirety of the planetary energies of the solar system in physical form, that wholeness, as we explain in Book 7, that is ruled over by Pan, God of Everything - including all Nature. Like gold, not being one of the colours in the rainbow sequence (though yellow is close), brown is the overlooked unity of the physical, pigmental spectrum, the colour gained from physically mixing all the paint hues together, a coarse reflection of the centrality of the Sun, of whose benefits the Earth is at the receiving end (compare the polarity of Thalia and Apollo in Book 9). Brown, of course, is the colour of earth itself - another neat little check.

THE HARMONIC RATIOS -v- DISSONANCE

When tuning a guitar or Indian tampura, you tune the strings to the common pentatonic chord. It is clear later why it is that within the octave the interval of the fifth (C:G), with a string-length ratio of 3:2, is called the dominant; the fourth (either C:F or G:C) at 4:3 the sub-dominant; and the third (C:E etc.) at 5:4 the mediant. If you play each of these combinations and follow them by the ratios of 5:3, 9:8 and 15:8, however, you will start to hear very slight discord creeping in - what some mediaeval theorists equated with evil (non-fitting), literally because the parts of these later divisions do not divide exactly into the string as a whole: hence Gregorian Chant allows only the first three harmonics. This is expressed by the captions surrounding a version of the Lambdoma given in the writings of Robert Fludd where the top combinations are considered heavenly: the bottom ones are manifesting into increasingly complex combinations of matter and therefore fraught with the potential for corruption under heavier laws as direct contact with the Source is lost:



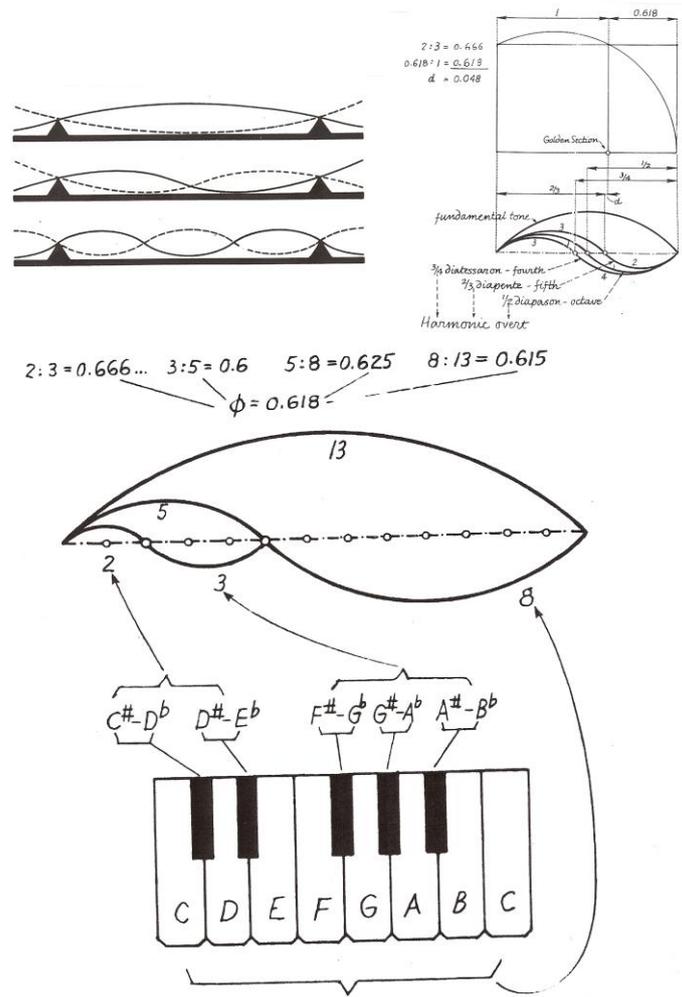
Ill. 1 - 21: Pure and Corrupt Harmonics as Sound descends into Matter – from Fludd [the top four rows of 10 dots make up the Divine Tetraktys revered by the Pythagoreans]

Which, then, are those subdivisions which harmonise perfectly? Go back to the whole string on the monochord again and pluck it as firmly as you can, this time noticing how different wave motions run through it: these are the harmonics, or reverberations - the echoes of other notes simultaneously called up against the main note, which we can pin down fully in a piano experiment shortly.

What this means is that, whatever note is sounded, *it has reverberations of any notes within it that are related by whole integers*, so they vibrate in the background: this explains the qualitative difference between a normal guitar and an electric one! Ill. 1-22 (top left) shows how the actual wave motions of string sections, starting with the unstopped string at ratio 1:1, fit into the string length available, naturally creating any sub-notes which accord to the whole. When actually stopped down at these notes, these subnotes can be brought to the foreground and ‘fixed’. For instance, if at half-way point the note will go up by an octave with the string at 2:1; when stopped down at a third of its length in the ratio 3:2 the fifth (G) is sounded; at a quarter of its length in the ratio 4:3, the fourth and so on (unfortunately the terms ‘fifth’, ‘fourth’, etc. do not logically relate to the numerals of the ratio - it is a red herring to try to understand them thus!) - meaning that they relate back to the whole string at 1 or the original note of C. To summarise:

- The whole of the string length plucked vibrates at the ratio 1:1 (base line)
- One half of the string length plucked vibrates at the ratio 2:1 (one octave above base line)
- One third of the string length plucked vibrates at the ratio 3:2 (the fifth)
- One quarter of the string length plucked vibrates at the ratio 4:3 (the fourth)

The composite illustration below, top right, expresses these ratios as a curve, in turn related to the notes on the piano. The Golden Section comes into this but we will not stop to analyse its magic at this point.



III. 1 - 22: The Pythagorean Octave as stops on a string related to the piano notes: Golden Section ratios also come into play (Book 4) – from Doczi

Western music theorists of the past considered only these four harmonics to be spiritual (*pneumata*) as in Plainchant: similarly ratios beyond these were named ‘body’ or worldly intervals by the Hindu theorists. This explains the purity of the music of Palestrina and other composers of his period who wrote essentially for the Church, in contrast to secular or even folk music, which have thirds as their psychic content, like the Hindu Mārga and Deshī Ragas. The Third, says Kayser, especially the minor third, is the interval of separation, the longing for wholeness and completion, the human cry for integration which remains unresolved and can be heard as the ‘wailing’ component of popular music, both west and east (think, for instance, of the poignancy of the heart-rending third in Gaelic or Arabic music). In the music of fifths and fourths, a spiritual resolution has been found and the soul can lock directly into Spirit through them. As Kayser puts it, the Octave, Fifth and

Fourth are found in Nature and in worship, but the Third belongs to mankind separated from, and seeking, heaven. He calls the basic harmonics measurable on the monochord 'tone numbers', the very foundation of Pythagorean Number theory where string lengths and frequencies of vibration (note) stand in reciprocal relation to one another. Unity/Unison, the full string-length at 1, is the First Harmonic, out of which all other harmonics arise.

All this understood, we are ready to conduct the Piano Experiment to show just how many harmonics there are beyond the first easily discernible few on the Monochord.

HARMONICS

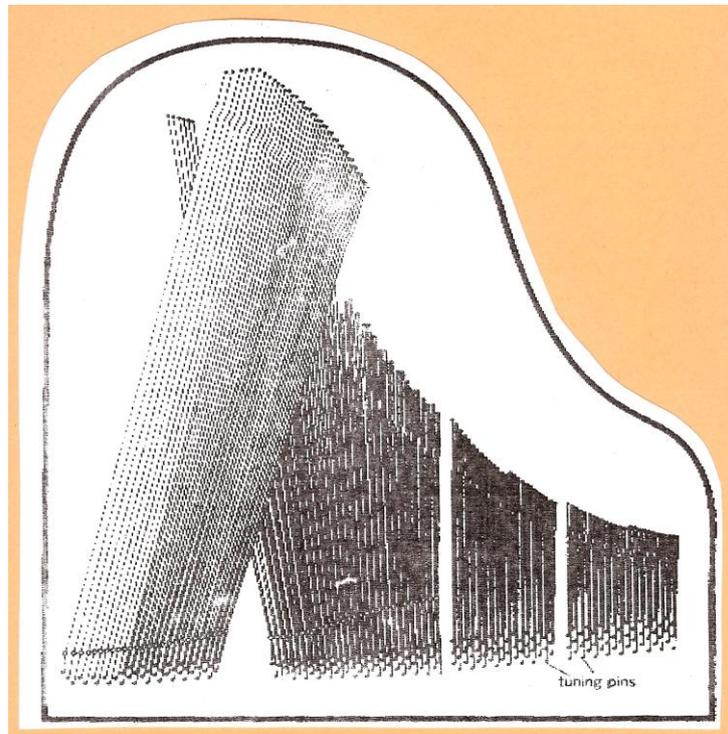
This is a more complex experiment, which demonstrates the phenomenon of harmonic vibration in spectacular fashion very simply. It may show up on a single string in the way described above, but when several strings are struck in each others' vicinity a more complex phenomenon takes place. The full extent of the results of this exercise is less immediately apprehensible to the senses, though possibly you will see some whirring strings, and certainly through the ear it is possible to hear the overall effect of how one string plucked affects its neighbours simply through its own resonance and not through physical contact with them at all. The physical experience can then be followed up with theory, thanks to the help of those who have measured sound minutely with scientific equipment, to arrive at a complete picture of what is going on. *For a preview of what will happen, pluck one string of a guitar or lyre and note how the others move and sound in sympathy with it.*

But if you can, please find a grand piano (not an upright) and open the cover in order to expose all its 220 strings.



III. 1 - 23: Basic features of the Grand Piano – resonance is increased by the huge sound box area

With the grand we will have to find another way to see which strings are activated as one piano key is pressed by the finger, activating the hammer which in turns strikes, rather than plucks, the string for that note. The shape of the piano beyond the keyboard seen from above gives some idea of the changes in string lengths required to accommodate the lowest and highest notes as well as those in between but in fact for practicality's sake the

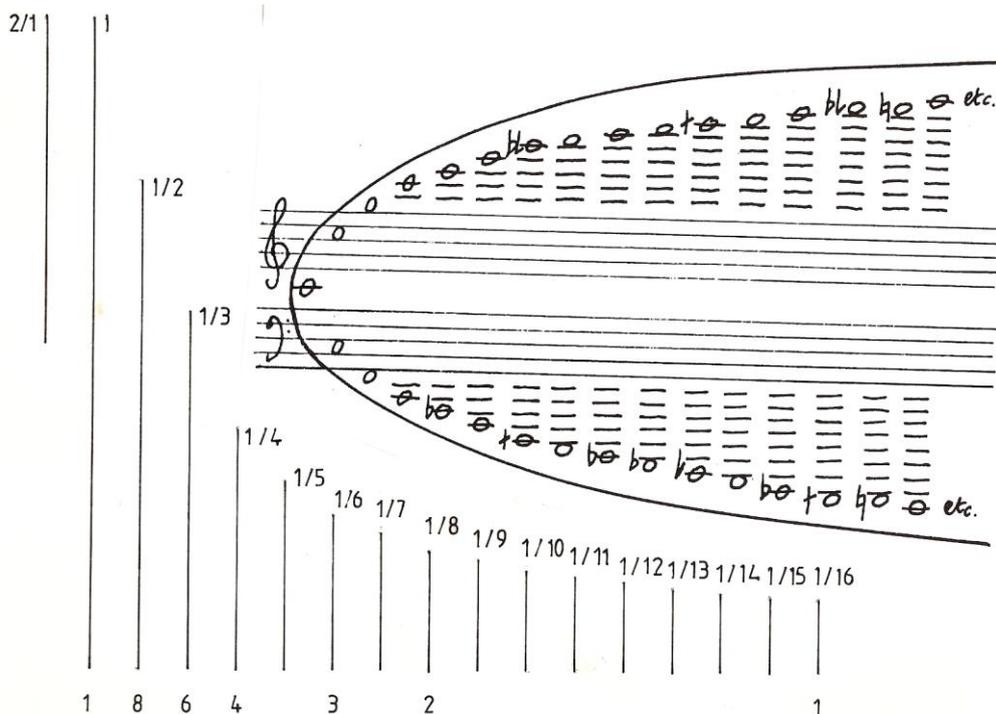


III. 1 - 24: The solution to piano wiring to achieve eight octaves-worth of strings in one instrument

lower-note strings are thickened (and therefore shorter than they should be) and crossed over the treble strings since if the same wire was used throughout, the piano would have to be as long as a 40-foot room!

Now you have opened up the lid of the piano, place small pieces of slightly folded paper on each string (the fold keeps the paper resting on each string), and then go round to the keyboard and, still standing, strike Middle C. Looking over into the inside of the back of the piano, you may be amazed to see and hear that certain surrounding strings have started to vibrate in sympathy; and the pieces of paper on strings that move will be shaken off, showing you the main reverberation distribution for the overtones.

The pieces of paper shaken off are visible evidence that vibrations have been transferred from the note struck to strings in the harmonic series related to that note, while passing over others! The first, most discernible, sixteen harmonics are shown diagrammatically below in terms of notes and related string-lengths (they could just as well be the pipe-lengths of a church organ):

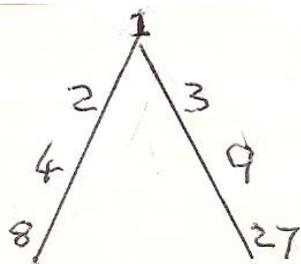


Ill. 1 - 25: Middle C: the first 16 overtones (notes and string lengths) and undertones (notes only) – from Kayser/Taylor (The main note of the long string and its overtones are heard simultaneously)

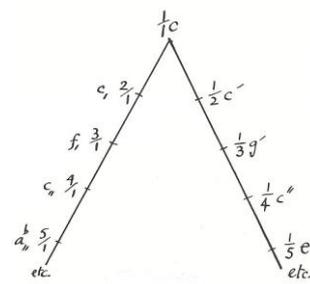
The strings on either side of the Middle C/Doh/Sa string simply respond to its vibration and they in turn influence sympathetic neighbours because of the whole number ratios of their vibrations to the original string struck. Thus the Harmonic Series, as all musicians naturally know, is a sequence of notes (or vibrations in the air) that set up sound waves at certain constant ratios which are heard as ‘overtones’ whenever any note is played - or, in fact, when any sound of any sort is made, as Brian Keenan’s experience showed. The varied richness of the human voice depends on the overtones at play in the throat, resulting from the activation of the ‘strings’ of the larynx (Ills 1-10 and 1-11), whereas mere noise lacks such neatly tailored, and therefore beautiful, resonances. Note simply that the harmonic series is different from the octave sequence, since in the former not all notes of any one octave vibrate in sympathy with each other along the range available and those that do are precisely the *pneuma* combinations just mentioned as favoured in Church music. Remember, not only will a single string set up sympathetic vibrations with strings next to it *if* they fit in perfectly with its own vibrations, but on its own while vibrating in one wave there will be vibrating at the same time and within the very string a whole set of smaller waves giving rise to the same overtones, as our diagrams show. If we were to take *all* the harmonics into account that are set off by striking the one note, Middle C, something like eight octaves of frequency are all activated together within the piano, but the micro-intervals between them shorten slightly more as octaves move out from the original octave, causing natural dissonance, the reason for which we cannot study until Book 13.

There is, in fact, a corresponding number of reciprocal *undertones* which are harder to register without scientific instruments, but are still remotely discernible to the ear, more by absence than presence. Langston Day in **Matter in the Making** writes, ‘In fact, the undertones are probably better left in the realm of ideas as the unmanifested counterpart to the overtones (see the *lower* curve of the ellipse in the diagram above). Something of their symbolic value will emerge if we consider that whereas the overtones correspond to successively faster vibrations and smaller vibrating particles (e.g. progressively shorter fractions of the monochord), the undertones represent slower and slower vibrations such as would be caused by increasingly large resonant bodies. The overtones lead to the ‘microscopic’ diminution of time and space: the undertones to ‘astronomical’ expansion - or put another way, Universal Contraction happens in the overtones: Universal Expansion in the undertones, the higher and lower ends of which are inaudible to the human ear (*fn. 1*).

Put another way, when Middle C is struck on the piano as Note 1, an entire sequence of seven sounds is activated without the transmitting strings having to be struck! The same harmonics would result from blowing on a trumpet set at C, but not so demonstrably as on the piano (for a valveless trumpet these, indeed, are the only notes available). Such is the phenomenon of resonance, of key importance for understanding why the Universe interconnects between one level of existence and another. Albert von Thimus, a 19C German scholar looking into harmonic theory, found in a treatise of Iamblichus the hint that the Greeks through Pythagoras had already discovered both the overtone and under-



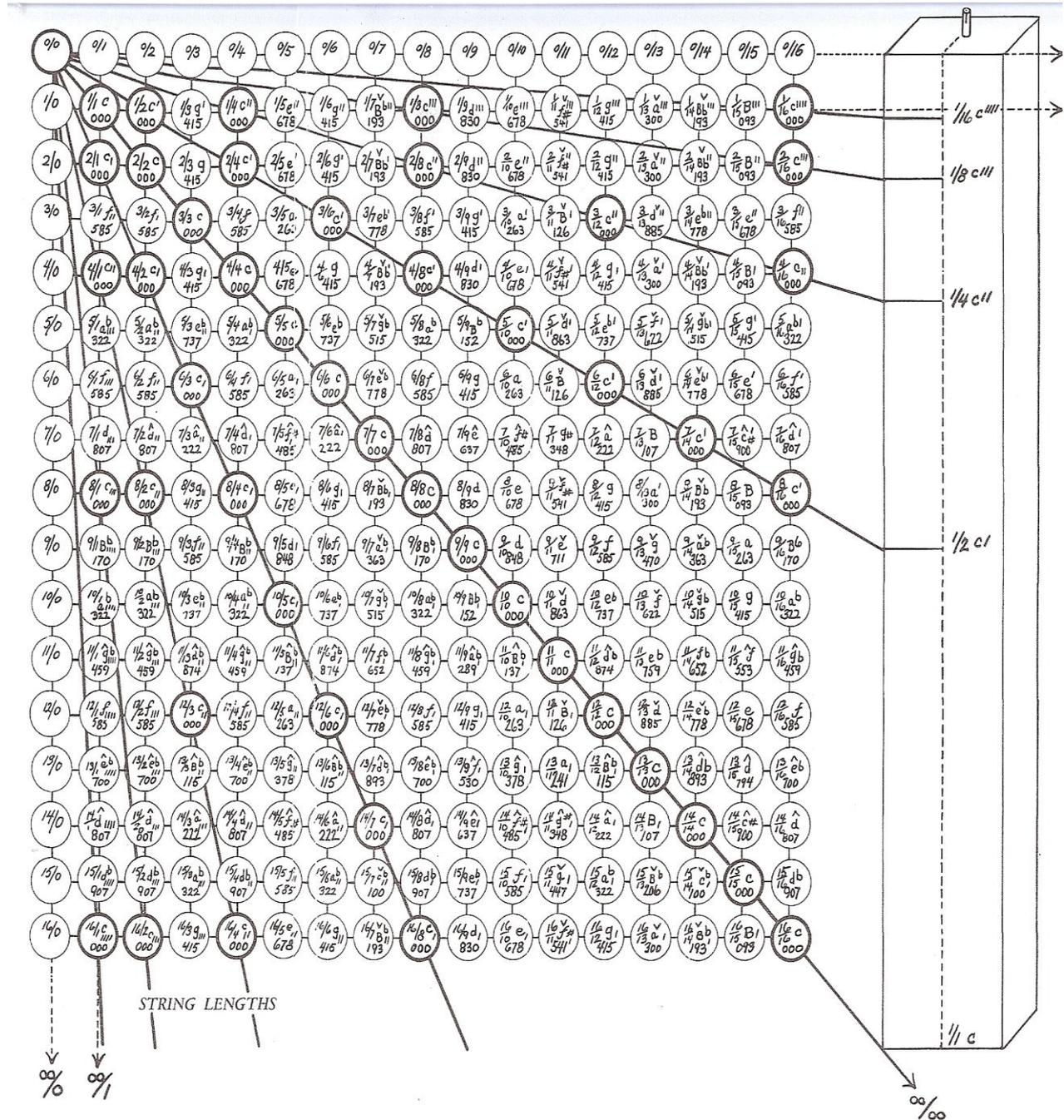
Ill. 1 - 26: Roughly sketched Lambda showing the squared and cubed successions from 1



Ill. 1 - 27: Thimus' rendition of the Lambdoma in terms of ratios and notes

tone series, expressing them by a diagram shaped like the Greek letter *lambda* (Λ) with a squared succession of number on one side and a cubed sequence on the other called the *Lambdoma*, alluded to also by the *Tetraktys* (Ill. 1-21 - more of which later in the series). So pregnant with the harmonic formulae of the universe were these diagrams that Pythagoreans would swear on it as we might on the Bible. Starting from Unity (1) at the top, the overtones go down the squaring leg, the undertones down the cubing side, marked both as numbers (fractions or multiples of Unity) and as the corresponding tones, here named as if Unity is the length of a monochord string sounding C. By filling in the enclosed

space with a network of intermediate tones and expanding the angle to 90°, von Thimus expanded the Lambdoma into a diagram named 'The Pythagorean Table'. His spiritual heir, Kayser, believed this was the fundamental diagram for the lost science of Harmonics used by Plato (hinted at by him in *The Republic* as the culmination of all knowledge):



III. 1 - 28: Thimus' Pythagorean Table, amplified by Kayser in relation to the Monochord (a large colour version by Barry Stevens is available on request (via Contact Us on www.cosmokrator.com))
 The three-numbered logariths written below the tone values are the logarithms of the string lengths on base 2 – they represent the distribution of all tones within one octave between 0 and 1000 as we hear them. Photocopy this illustration, enlarging it onto A3 paper, to get the full benefit.

The nature of the repetition of the harmonic phenomenon never varies: the ratios are constant and will never be any different from this series. This fact of physics is a reality of

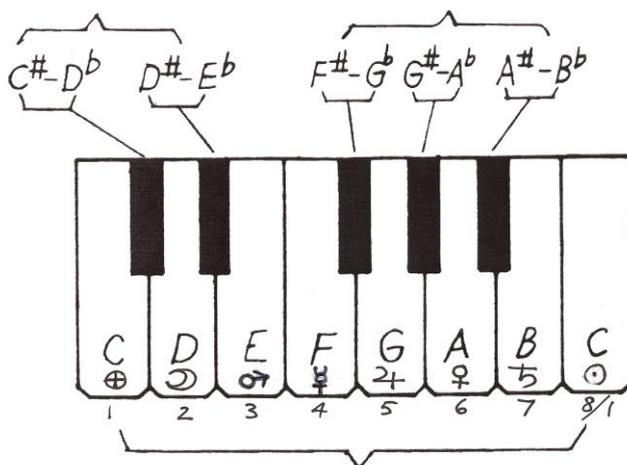
the cosmos from which we can infer a law of vibration in operation as a principle of existence, for it is not brought about or invented by human agency. It is a law beyond our human capacity to alter, and we have to conform to it if we want to make beautiful music or, in fact, exist at all. The numerical analysis is a key to understanding how number, or vibration, is transmitted from one medium to another, even as thought (Ruper Sheldrake's **Seven Experiments to Change the World** shows simply and logically how this truth operates in everyday situations). Hans Kayser in **Akroasis** fully analysed the possible reverberations between notes as put forward by von Thimus in the Pythagorean Table to such an extent that their comprehensiveness (if not their comprehensibility) is as overwhelming as an ocean of sound, were we to listen to the entire universe in operation without any filters. Kayser demonstrated how the Pythagorean Table lays out the numbers and proportions for an ever-diminishing length of plucked monochord, with corresponding notes/frequencies. Theoretically, there is no end to the reverberations that could be noted, but our senses give up beyond a certain point. 256 harmonics are logged, and these are not all there are, quite apart from the reciprocal undertones. Not all will be consciously heard, but they will be actively present, adding to the 'tone', 'timbre' or 'value' of the quality of sound: the sitar makes the overtones much more apparent, for instance, and is therefore richer than any other stringed instrument.

Discussing the table, Langston Day points out: 'Its overtones fill all of microcosmic space; its undertones fill all of macrocosmic space. But the note itself, visible... at the cusp of a parabola, carries an emptiness around it (Ill. 1-25). A little distance away there is the 'white noise' of innumerable harmonics extending in both directions'. Kayser studied the implications of the Pythagorean Table and explained: 'If one connects any ... series of equal tones (e.g. 2:3/4:6/3:9, a remarkable thing happens: these lines meet at a point *outside* the Table, shown as 0/0 on the diagram' (Ill. 1-28). To Kayser, the single most important revelation of the Pythagorean Table was that outside and beyond it, the point 0/0 has no sound, but is the Silence towards which all tones tend. If 1:1 is the Creator God, then 0:0 is what various traditions have called the Absolute, Beyond-Being, Nirvāṇa, Parabrahman, the Cloud of Unknowing. None of these terms are associated with any one religion, though they are valid within any of them. They refer to states of being open to every human's range of experience, whatever their professed faith or lack of it - this is the beauty of the Pythagorean system, neutral as The Tao. The tradition of Pythagoras, taught at the start of his spiritual life by the Priestess of Delphi, Themistoclea, was Druidic, for he was a hierophant of the Lyre-playing Hyperborean God, Apollo - and of Orpheus who tamed animals with the beautiful strains of his strings (Ill. 1-6). All creatures have divine longings to return to their unmanifest state of pure musical principle in the Silence Beyond:

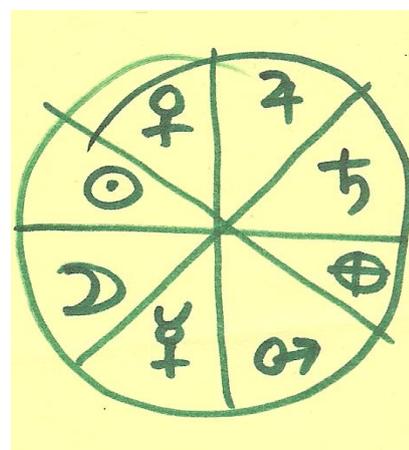
Buddhists would say that even plants and rocks do, and in later chapters we see that even their forms, though more static, are harmonically organised and octaval. We are talking of universal vocabularies beyond the forms of any specific religious system - these we sometimes call in the Cosmokrator books the Seven Veils of Isis. In a later book on synaesthesia we will include other spectra we take for granted, such as taste (there are people who experience food as musical notes - and a blinded soldier returning from Iraq was reported on the BBC website (15 March 2010) as being enabled to taste colours through a machine that converts colours into electrical impulses sent to the tongue).

In fact, if you remember from Book 0, the whole created Universe was seen as nothing but the result of the different combinations plucked on the Master Monochord by God (Ill.0-29). Coming to grips with these terms by playing around with your own diagrams and bringing them to life on a musical instrument or voices sung together (madrigals are very suitable) is well worth the effort if you are to fully benefit from the later chapters of this book. As important as understanding the theory is the practice of Number and Music in order to activate your soul tuning which is what Cosmokrator's books aim to do - hoping bring some of mankind back into sympathy with the Cosmos before it is too late.

Even non-musicians know that to jump an octave is to move from one note to another by an interval double the number of units of the first, in the ratio 1:2 - and that if both (notes 1 and 8) are played together, they sound to the ear as the same note echoed in *diapason*. Classical civilisation, whether in ancient Greece, Rome or during the Renaissance and the Enlightenment, gave these principal ratios names, seeing them as equivalents of planetary energies with their accompanying Muses (Ill. 1-17 and Book 9). We dwell on this at more length in Book 9 on Astronomy and Book 11 on Architecture. In the meantime below we give the basic Pythagorean Octave again, this time with Planets marked on each note:



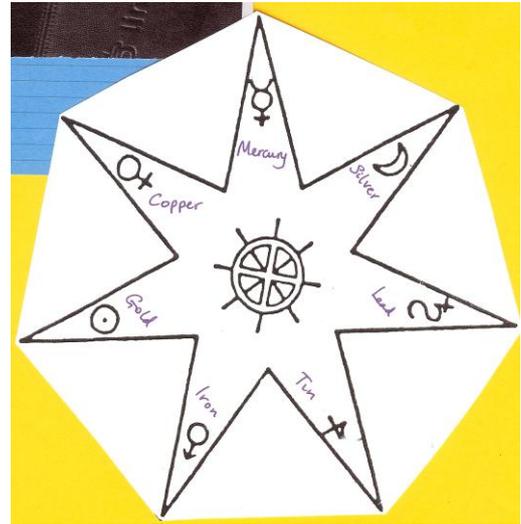
Ill. 1 - 29: Piano notes and their Planetary sound (compare with Ill. 1-18)



Ill. 1 - 30: The Octave is best shown as a circle (a cross in a circle at middle C is the sigil for Planet Earth, anchor of the Planets)

We can bring in another set of equivalences here: the concordance conventionally made in the antique world between notes, planets and *metals*:

Planet	Metal	Thermal Conductivity	Electrical Conductivity
MOON	Silver	100	100
MERCURY	Quicksilver (Not scaled because usually liquid)		
VENUS	Copper	94	95
SUN	Gold	74	72
MARS	Iron	20	17
JUPITER	Tin	16	13
SATURN	Lead	8	8



Ill. 1 - 31: Planets, Metals and Conductivity

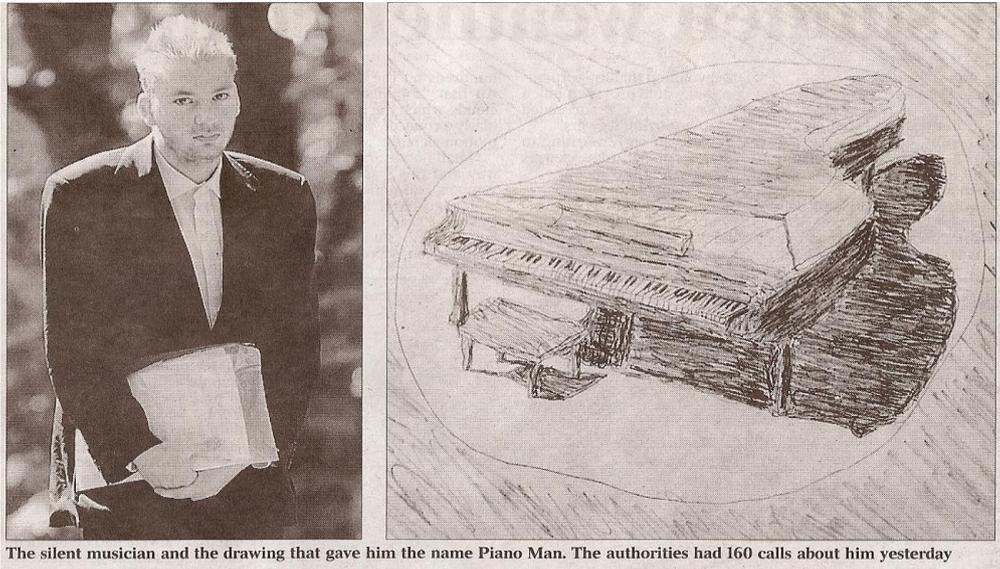
Ill. 1 - 32: The seven planets and their metals expressed as a Seven-Star

We would eventually want to expand that Octave of equivalences to include all the undertones and overtones of substance to the level of detail of the Pythagorean Table (Ill. 1-28) - towards which the Table of Elements goes some way (more in Book 3):

Li lithium 3	Be beryllium 4																	H hydrogen 1	He helium 2										
Na sodium 11	Mg magnesium 12	Sc scandium 21	Ti titanium 22	V vanadium 23	Cr chromium 24	Mn manganese 25	Fe iron 26	Co cobalt 27	Ni nickel 28	Cu copper 29	Zn zinc 30	B boron 5	C carbon 6	N nitrogen 7	O oxygen 8	F fluorine 9	Ne neon 10												
K potassium 19	Ca calcium 20	Y yttrium 39	Zr zirconium 40	Nb niobium 41	Mo molybdenum 42	Tc technetium 43	Ru ruthenium 44	Rh rhodium 45	Pd palladium 46	Ag silver 47	Cd cadmium 48	Ga gallium 31	Ge germanium 32	As arsenic 33	Se selenium 34	Br bromine 35	Kr krypton 36												
Rb rubidium 37	Sr strontium 38	Lu lutetium 71	Hf hafnium 72	Ta tantalum 73	W tungsten 74	Re rhenium 75	Os osmium 76	Ir iridium 77	Pt platinum 78	Au gold 79	Hg mercury 80	In indium 49	Sn tin 50	Sb antimony 51	Te tellurium 52	I iodine 53	Xe xenon 54												
Cs cesium 55	Ba barium 56	Lr lawrencium 103	Unq unnilquadium 104	Unp ununpentium 105	Unh ununhexium 106	Uns ununseptium 107	Pm promethium 108	Tl thallium 81	Pb lead 82	Bi bismuth 83	Po polonium 84	At astatine 85	Rn radon 86																
Fr francium 87	Ra radium 88	La lanthanum 57	Ce cerium 58	Pr praseodymium 59	Nd neodymium 60	Pm promethium 61	Sm samarium 62	Eu europium 63	Gd gadolinium 64	Tb terbium 65	Dy dysprosium 66	Ho holmium 67	Er erbium 68	Tm thulium 69	Yb ytterbium 70	Ac actinium 89	Th thorium 90	Pa protactinium 91	U uranium 92	Np neptunium 93	Pu plutonium 94	Am americium 95	Cm curium 96	Bk berkelium 97	Cf californium 98	Es einsteinium 99	Fm fermium 100	Md mendelevium 101	No nobelium 102

Ill. 1 - 33: The conventional Table of Elements (other arrangements are possible – see Book 0)

Before we leave pianos, for some relief from all this theory I retell the story of the Piano Man which reached the newspapers on 17 May 2005:



The silent musician and the drawing that gave him the name Piano Man. The authorities had 160 calls about him yesterday

Ill. 1 - 34: The tragic Piano Man

Investigators are seeking clues in the music of the man found unable to speak but with the talent of a piano virtuoso.

The musician, whose photograph was being broadcast around the world yesterday, has a repertoire ranging from Tchaikovsky to the Beatles but has not uttered a word since being found last month...

When he was found, the designer labels of his black dinner suit, sodden with seawater when he was discovered by the police on the Isle of Sheppey, Kent, had been ripped out. He was dripping wet and wearing a white shirt and tie beneath an evening suit.

The man drew a picture of a grand piano. Michael Camp, his social worker, showed him a piano in the hospital chapel and the stranger delivered a stunning four-hour performance. 'I cannot get within a yard of him without him becoming very anxious', Mr Camp said. 'yet at the piano he comes alive. When we took him to the chapel piano it really was amazing. He played for several hours, non-stop, until he collapsed'.

Taken to a psychiatric hospital, appeals were broadcast asking for clues as to who he may be. The outcome of this tragic case is not known. The Times 17 May 2005



Ill. 1 - 35: Still Life with a Piano by Picasso 1919 – Berggruen Collection National Gallery London

Whether it involves going to a concert, or just playing a tape or CD, perhaps like the piano man we should stop let some music wash over us and listen to a symphony, Italian Baroque string music, or a Bach or Mozart violin concerto. But start with the silence exercise described in Book 0, thus placing yourself at the point 0/0 in Ill. 1-28 and then let the notes start streaming in. Note the effects this music has on you, like that stream of numbers in the Pythagorean Table. You'll find obstructive thought flitting by, but let them flit on, rather than settle on you. To experience the simplicity of the first string divisions, on the other hand, listen to folk music from anywhere in the Third World, perhaps noting what scale it is set in.

Apart from listening to the performance of others, it is so beneficial to play your own music on one instrument or another, an obvious activity to suggest you do - but the most powerful instrument of all, because it is lodged in your body, is the human voice, and you would do nothing but benefit from chanting musical scales or songs for at least half an hour a day. As the voice is at the throat chakra (Ills 0-16/17/20) all the other chakras are partially activated by its resonance (as we would expect after our study of the overtone phenomenon) as a bodily version of the plucked monochord/spinal chord. When you sing, you will thus notice beneficial effects all along your body octave (more in Book 6).

You will now, I hope, be in a rested enough state to take on a little more basic arithmetic for the next section.

MORE ABOUT VIBRATION

Modern equipment can now measure vibration in astonishing detail, sometimes using units of measurement and other number systems that obscure the essential proportionality of universal Number. We have to work with both, and be able to translate back. Thus if Middle C (a wave length of 134 cm/5 foot approx) is taken as vibrating at 256 cycles per second, the note C one octave higher (C¹) will vibrate at 512 cycles, retaining the 1:2 ratio to be expected from a diapason (Ill. 1-16). Subsequent higher octaves will come at 1024, 2048 cycles per second, and so on, while 9 octaves above Middle C gives 131,072 cycles per second. Top C on the piano vibrates at 4096 hertz/cycles per second, with a wavelength of 8cm/3 inches approx, whereas the lowest C on the piano, vibrating at only 32hz has a wavelength of 40 feet with a pitch much like the voice of a whale, which has a correspondingly large larynx!

So it is, that the higher the number of vibrations, the higher the note and the shorter the string, or body. The actual frequencies can therefore be calculated for each note if we know that Middle C is at 256hz and its octave at 512 (Ill. 1-46). It is the harmonic notes, fitting easily into each other because they are multiples of 2, 3 or 4, which are going to be

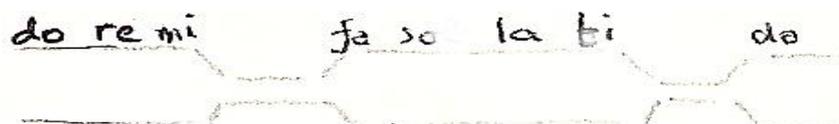
the ones that get activated in the harmonic series, although the minute shifts between notes are sometimes resolved in a Golden Section ratio, which is how the white keys on the piano stand in relation to the black (Ill. 1-22). There are 8 white keys to every 5 black keys, the latter grouped in a 3 and a 2. The series 2:3:5:8 is the beginning of the Fibonacci Series, the ratios of these numbers all gravitating towards the irrational and perfectly reciprocal 0.618 ratio of the Golden Section (which comes up in different ways throughout the series of books). Since vibrations have frequency, which can be measured, all can be expressed by relative numbers. Number and vibration are constant, immutable, inevitable and inviolate and interfered with by us only at the expense of our distortion. Wherever there is sound there will be harmonics and overtones vibrating in mathematically calculable ratios at all frequencies, even when experienced as psychic communication or spiritual revelation. Thus the laws of harmony - and their converse - discord - can be analysed and their common factors discerned.

The notes of the natural Pythagorean scale of our Western Tradition vibrate in relation to each other in frequencies which can be reduced to their simplest interrelationship as:

1	2	3	4	5	6	7	8
C	D	E	F	G	A	B	C
Doh	Re	Mi	Fa	Soh	La	Ti	Doh
24	27	30	32	36	40	46	48

Ill. 1 - 36: Vibrations between notes on bottom row (only 2 between 3/4 and 7/8)

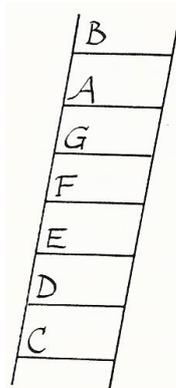
This shows that intervals between the notes vary between 2, 3 or even 4 units in this octave, altering the nature of any Raga according to the starting note and minor or major sequence. Minor and major keys differ from each other only in the length of steps between their intervals. Gurdjieff noted there were two ‘squeeze’ points on the octave (expressed below sketchily as a rough back-of-cigarette pack diagram:



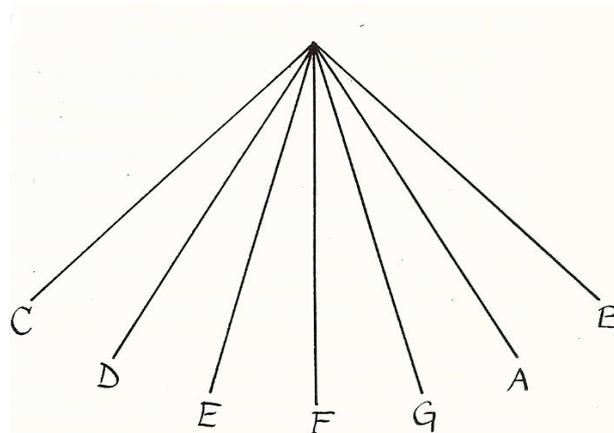
Ill. 1 - 37: Gurdjieff's pinch points

where the intervals are tighter between E&F and B&C¹, borne out in the table of Ill. 1-36 which shows only two units between these two pairs of notes. Langston Day writes, ‘The semitones do not necessarily fall between the 3rd and 4th and 7th and 8th steps. In the scale D, for instance, they fall between steps 2 and 3, 6 and 7, whether one takes the scale up or down... [but] every ... musician has a favourite scale’. The principle is valid, even if the

pinch points may occur at differently at the beginning and end of the scale. In terms of events or self-development Gurdjieff and his pupil Ouspensky saw these as stages somewhere at the beginning or very end of a process where extra energy (Ouspensky refers even to ‘shocks’) needs to come in from outside to enable a process to either take off or reach final completion rather than die at the outset, or never quite make it to the end (the notes in between are those stages where everything is experienced as plain sailing). They both saw the creation of the world as a downward-reaching Scale of unfolding notes, and the return to Source as an upward-leading Scale which could be expressed as a Ladder (an image that appears in the Bible). The Notes can also be seen as simultaneously emanating from the Centre like a sunburst (the mandalas of different religions express this in varied ways - Blavatsky and Bailey often referred to the ‘Seven Rays’).



III. 1 - 38: The Octave as Ladder

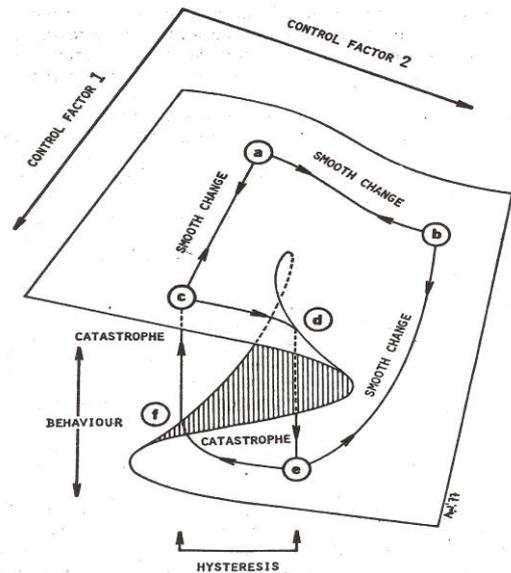


III. 1 - 39: The Octave as Simultaneous Radiation

These ways of expressing the notes of the Octave and their unfolding are tangible supports for aspects of cosmology that are easier to understand by the man in the street than the formulae of modern Physics which require knowledge of advanced mathematics!

If the Creation of the Universe is the first Grand Event of the Universe, contained within it are myriads of sub-events, and recent Catastrophe Theory has arrived at a formula which spells out the stages for the way events unfold in the physical world in all their specificity which in the grand scheme of things we can still see as versions of underlying secondary octaves unfolding with very similar points of hiatus corresponding to Gurdjieff’s pinch points. It was René Thom who reached the conclusion in 1965 ‘that for a very wide range of processes only seven stable unfoldings, the seven ‘elementary catastrophes’ are possible’. The theory could apply to a process as simple as water coming to the boil or the swarming behaviour of locusts. Woodcock and Davis write, ‘The unfoldings are called catastrophes because each of them has regions where a dynamic system can jump suddenly from one state to another, although the factors controlling the process change

continuously'. At yearly conferences in the Sixties sponsored by C H Waddington in Bellaggio, Thom's theory was taken up by people in many different disciplines, notably Zeeman, a biologist who applied it to heartbeat and nerve impulses and then turned to social situations such as the outbreak of a prison riot - or Carlos Isnard to a government's decision to go to war. Zeeman and Isnard 'designed a "catastrophe machine", an arrangement of cardboard and elastic that jumps suddenly from one position to another and back, although the movement that leads to the jump is smooth and continuous':



III. 1 - 40: Catastrophe theory and the stages for Event Unfolding – from Woodcock and Davis

Their diagram here looks like a mixture of the unfolding of the Octave both in ladder *and* sunburst modes! Thinking of an earthquake or war scenario, the Doh (1) of the sequence has already sounded before the event erupts and as the first stages occur it is still not disastrous; *then* the actual event unfolds effortlessly in quick consequential succession after the first pinch-point and cannot be stopped. The second pinch-point is reached where it is often extremely difficult, even when it seems to be over, to bring the entire event to a resolved conclusion at C¹.

The inevitability of the Octave of Process as we might call it is well summed up by Woodcock and Davis:

The Greeks discovered that of all possible regular polygons ... only three (the triangle, the square and hexagon) can be packed edge-to-edge to fill the plane. That is a mathematical restriction on anyone who tiles a wall or floor, for example, and it has nothing to do with the material of the tiles or how they are applied. The Greeks also found that if the regular polygons are assembled as the faces of three-dimensional solids, only five such solids can be constructed. And these polygons and solids appear throughout nature, in snowflakes and diatoms and crystals and honeycombs - not because geometry dictates to nature, but because there is no other way for certain natural processes to turn out. ... Thom believed that similarly the qualitative, topological patterns of behaviour seen in the elementary catastrophes must recur in many processes. [Woodcock & Davis *Catastrophe Theory* p.35]

PAUSE

At this juncture after so much theory, obedient to the Octave of Process, it is worth pausing to spend time going through the diagrams of this book so far, perhaps drawing them out for yourself, sounding them on an instrument (or singing them) so you recognise the patterns automatically. The universality of Pythagoras' teaching lies in seeing the master language of the universe as Number, expressed as Vibration, and if I had my own primary school I would base my syllabus on it - there is a term's work in this little book!

This knowledge is important for our own development because, says Pythagoras, due to mankind's innately harmonic character that reflects pure Spirit (all Number in Potential, held in perfect balance) our higher faculties link to its measure instinctively and our higher nature responds to beautiful sounds or forms since, even though at different levels, their vibrations down the chain of planes, or worlds, are on the same note. Living with this awareness exercises that higher self, and Man's very function, Pythagoras argued, is to measure everything in the universe against our inner divine monochord. This faculty in modern man has slackened and loosened, and we need to reactivate it by tightening it and plucking at its parts again, quite apart from arming our children with it from the very beginning of their life.

At more or less the halfway point in this short booklet, back to more exploration!

END OF PAUSE

MORE ON RESONANCE

By analogy with the piano experiment, and as a prelude to material about gongs and bells coming up, we can start to see that we do not know the vast extent of our soul unless we set it into resonance by some outside agent at the pinch points of our life where we get stuck. George Eliot at the head of Chapter 31 of **Middlemarch** quotes the following poem:

How will you know the pitch of that great bell
Too large for you to stir? Let but a flute
Play 'neath the fine-mixed metal: listen close
Till the right note flows forth, a silvery rill:
Then shall the huge bell tremble - then the mass
With myriad waves concurrent shall respond
In low, soft unison.

During recent decades in the West we have witnessed the phenomenon of Gong Therapy, set up in Britain, for instance, by former actor Conreaux, who was reported in the Sunday Times magazine **Style** (10/08/97) as saying, 'After gong healing, people find themselves in remission from cancers ... you feel it in your body as well as hearing it. This musical touch turns the body into one big ear and creates a sense of well-being - it's very similar to the sound we hear in the womb'. Liz Chapman, who wrote the article about him, reported that after a two-hour session lying on the floor being penetrated by deep gong vibrations, she felt her body was being lifted off the ground by the sheer force of the great waves of sound, and felt afterwards that she could run a mile. Conreaux issued a CD with 11 gongs set to vibrate in synchronisation with the intervals of the Planets (see Book 9). Quite evidently, it is the resonance of the harmonics that restore people to a balanced, neutral state, as church bells and Buddhist temple gongs used to do as common practice until recently. Conreaux believes that if enough gongs and bells were rung at various times throughout the world their healing tones would bring mankind back in tune with nature - be we could go a long way by reactivating those old neglected bells and gongs we already have waiting to be resounded. Conreaux' plan is to add to their number by melting down weapons of war and recasting them into bells and gongs to furnish a global network of Peace Bell Gardens during the 21st Millennium.

Harmonic tuning is vital in the creation of a spiritual ambience that can awaken the human spirit by touching its concordances, as is borne out by the following newspaper story in **The Times** (18 Feb 1998) showing how many modern people almost have a dissonance wish not dissimilar to a death wish:

Clergy and conservationists have clashed over attempts to harmonise an out-of-tune peal of church bells. The battle of St John's, Waterloo, has been fought over eight bells which have

been in tune since they were hung in 1825. Churchmen, bellringers and worshipers appealed for a harmonious sound to summon churchgoers. But officials from English Heritage wanted the bells to remain out of tune to preserve their rarity. Now the dispute has been muffled by a compromise. The bells will be rehung next week with five tuned to near-perfect pitch and three, including the key bell, the tenor, left out of tune....

Now the church has a peal of bells which have been tuned so the rarity value has gone but the tonal discrepancies between them have actually been increased', said Doug Snoswell, a ringer at St John's. 'We are particularly annoyed about the tenor. It is the tenor that makes a ring of bells. When any bell is out of tune it sounds mournful instead of joyous'. Kate Hoey, Labour MP for Vauxhall, protested to English Heritage. 'The bellmaker's intention in 1825 must have been to have the bells ringing properly', she said.

In Britain the Millennium was marked throughout the country (perhaps more appropriately than by the sadly uncosmic Millennium Dome) by a campaign to ring new or mended single bells - or peals of bells in larger sacred buildings. Kenneth Macnab wrote such a good article about it⁹ that most of it is worth quoting:

The sound of bells pealing before midnight is part of many people's idea of Christmas night. It is at once an immediate experience with ancient resonances. In a parish setting, the traditions of surpliced choirboys, Christmas trees, candle-laden altars, Christingales and Nine Lessons and Carols are barely a century old. Yet the sound of bells calling the faithful to prayer is an ancient one.

In the 16C and 17C the English Reformers and Parliamentarians largely left bell towers and their contents intact. Some bells from the great abbeys passed into other hands, such as Great Tom from Osney Abbey which made its way to Wolsey's new Christ Church, Oxford. The Anglican canons from the first demanded that each place of worship have its own bell, to be rung before the daily offices of matins and evensong. As in the Middle Ages, the times of the day were to be marked with prayer and those unable to attend are assured that the priest is in church praying on their behalf.

Again, the New Year has traditionally been greeted with change ringing...On New Year's Eve millions of ears turn to the thirteen and a half ton Big Ben, housed in Barry and Pugin's magnificent bell tower at the Palace of Westminster. In hundreds of bell towers the old year is rung out with the bells half-muffled, slowly and softly, until seconds before midnight Ringers climb up, remove the muffles and the New Year is rung in with the fast, crisp sound of open bells...

To mark the Millennium many churches have installed new bells, some duly 'baptised' with holy oil by the bishop. Others have restored bells which have not been rung for many years, and across the country many new volunteers have begun to master the intricacies of change

⁹ *The Times*, 22 December 2000

ringing in which bells change places with each other in predetermined patterns... the Liberty Bell in Philadelphia, the Great Bell of Montreal, the recent peal of ten bells in the National Cathedral in Washington and 12 at Toronto Cathedral are part of an export tradition which dates back at least to the middle of the 18th century... In 1991 the Whitechapel Foundry cast and installed the world's first peal of 16 bells at St Martin's-in-the-Bull-ring in Birmingham.



Ill. 1 - 41: Casting a bell at the Whitechapel Foundry (The Times 22 December 2000)

The Foundry itself is of historic importance, dating from 1670, a time when demand was high for bells to ring from the new churches of the rebuilt City of London... After the Second World War the foundry was asked to replace many lost peals, including those at St Mary-le-Bow and St Clement Dane.

Most of the world's religions have distinctive calls to prayer: the call of the bells is as recognisable as the muezzin's call from the minaret. As with many religious symbols, such as light, fire and water, the call of the bells is an elemental one. The sound of a full peal over the cathedral close in a mediaeval city, the toll of the muffled bell at a funeral, the clashing sound of bells rung together in the European tradition.. is a powerful one...

Parishes whose bells are silent notice their absence keenly. The ringing of bells in 1945 after six years' enforced silence remains a vivid memory for many...

Until the population and urban explosions and the advent of the train which rationalised time-keeping most everyday Christian life was run by bells. Their profound effect on cleansing the souls of the congregation by their daily resonances is untold - yet these beneficial vibrations at the time were taken for granted and their absence similarly unnoticed until the damage by absence was too far gone. Now modern man does not notice

how much in need of a daily polish his neglected soul is by such invisible means. Tuneful music is important as a vehicle for religion, to be decided by participants as well as the supposed higher authorities who often don't know much about the subject, having themselves been disfigured by modern life. Its modern misuse, especially within what claims to be a religious context, means that it can insidiously undermine the very foundation of spirituality which it is meant to build up in order to raise the fabric of the inner man by bathing it in restorative chords. Today even the clergy sometimes fail to understand the nature of heavenly harmony, despite their appointed role as spiritual leader. Pop music played in church is a mismatch of modes, but so can sterile 'churchy' music with soprano choirs like a cloud of gnats shrilly whining in a summer haze.

The story of how we became untuned is interesting, and has to be looked at in two main stages if we are to understand what a slow and insidious process it has been.

THE UNTUNING OF MODERN LIFE

Listen to an average group of primary school children, first in a depressed area of London then, say, in a South African township, and you can hear immediately that the latter are still tuned, for they can naturally sing the richest and most beautiful harmonies without even trying, or needing to be taught. Need I say more about the tunelessness and lack of voice quality of western state school children? They embody the sick Western condition through our ears (of course there are exceptions - I am talking about the overall standard).



Ill. 1 - 42: Still Life in front of Window St Raphael by Picasso 1919 – Berggruen Coll. NG London

In their cubist paintings (where music and musical instruments are often the centrepiece) Picasso and Braque tellingly put their finger (or their paintbrush) on the way we now experience life - as a series of bits of the whole all streaming in together in any one moment, scattering our attention amongst competing foci, even when we ourselves are not moving. Having studied the natural scale, one would think nothing would be easier than to stay with it, but modern man's concentration is scattered. The numerical series of music and harmony, 1 2 3 4 5 6 7 is childishly simple, accessible to every human being, not causing the least anxiety in understanding it. According to Hindu theology, no soul is born as a human by mere chance, and you will remember in Book 0 we discussed how the human frame embodies cosmic law and at the same time is nothing other than a receiver and transmitter of the Octave, including Song which sounds through the body and lifts the spirit. This is where Cubism has its mystical side, as in Braque's painting of the woman playing a guitar which suggests the vibration of the notes and the interpenetration of levels of matter as the woman (herself often equated with a guitar by Braque and Picasso) while seated on a chair experiences the notes of the resounding instrument in her lap:



III. 1 - 43: Woman with a Guitar Sorques by Braque 1913 – Pompidou Centre Paris

What does it say about modern school life that many don't even bother to have assembly in the mornings, to sing together to start the day off? Whoever set up British schools in the

first half of the 20th century knew a thing or two about real education! The true principles of the natural scale, if nurtured and not allowed to fall into the misshapen, is so innate in us that even children can handle the diversification of notes within the complexities of the world around them if they start from this simplicity, by doubling, multiplying by three, for or five, or using the same numbers to divide, add or subtract - including the use of fingers, toes and other parts of the human body as aids in counting if need be (see Book 14 on ancient measures).

WHY THE TEMPERED SCALE UNTUNED MODERN LIFE

It is because of the infinite gradations available within the main vibration field set up by musical sound that the points of division between one note and another can be minutely shifted. In the Modes, or 32 families of Indian Ragas (Ill. 1-17) deliberate use is made of slight moves away from the natural scale in order to create changes of mood. This is a constructive and deliberate use of micro-intervals for artistic effect, and quite different from what has happened to the Western Tradition of music with the introduction of the Tempered Scale (should I say Tampered with Scale). Berendt in **Nada Brahman** writes well about the flexibility of the Pythagorean Octave in giving room for slightly moving the borderlines - something we do with real-life events all the time. How each scale is adopted along with its particular set of intervals, it is surprising to discover, is conditioned for each cultural period by whichever set of intervals is deemed the most 'right' - giving the desired effect for the civilisation concerned. The scales of different musical systems, writes Daniélou, depend on two factors: obedience to the irreducible nature of harmonics, but tempered by social custom. In his **Introduction to the Study of Musical Scales** he demonstrates how differently musical practice developed in Europe compared with India and China (see Book 12).

Diverging from the Hindu musical tradition, European music has now evolved from the Greek convention into something comparatively artificial, since for post-Renaissance polyphony the tempered scale was devised with 12 arbitrarily *equal* chromatic intervals. We saw above in our study of the octave that the original octave has varied intervals between notes and is much more organic, but the tempered scale eliminates Gurdjieff's 'squeeze points', distorting the true nature of the Octave (see the tables in the section on Good Government, below).

As we have seen, the harmonic series contains all the notes of the major scale within the octave (C D E F G A B C) - except that in the true harmonic series (from one strike of Middle C) B actually vibrates at B^b and F at F[#]. These nuances occur on the basis of the mathematical relationships in the intervals between notes that arise out of the primordial

nature of vibrations and waves. From the point of view of the modern performing musician, the overwhelming necessity to find, among all possible deviations from the natural scale, *the greatest degree of workable harmony for all instruments working within an orchestra* even from Renaissance times led to the tempering of the naturally occurring note of the B⁷ to B and of the F[#] to F.

This is astounding, for these two shifts on their own explain how modern life, without most of the public being consciously aware of it, is run on notes that are slightly 'off' (compare the bell-tuning story told above)! The ancient Greek, western Church and Indian traditions, confirmed by our own simple experiments on the monochord and piano, are some of the approaches to prove the existence of natural tuning, to which Pythagoras' simple numbering provides the theory. We need to look further into the question of how modern man has been untuned for the sake of tying in the many instruments of the orchestra, or of many octaves within a piano, because although it may not seem of much significance, it is in reality a matter of grave spiritual import because people in general have become divorced from the natural tone coordination and ratios of 'real' music and no longer have the ability to recognise true ratios, our ears battered and assailed as they are by the discordant vibrations of technological life and deadened to interval and pitch. As pointed out with reference to school children's singing, more primitive peoples are physically more whole as their life styles are more natural and their harmonic sensibilities less worn down.

As already pointed out, when a violin or piano string is activated at a certain tension, length and thickness and set in motion at a frequency of 256 vibrations per second, it should sound what we know as Middle C. But today, in fact, because the idea of 'standard pitch' is paramount, this frequency number, sounded in ancient cultures and in past centuries almost up to the present day, is not often used. Because of the many modern musical conventions which are considered 'better', a new set of numbers is now applied, with the scale starting at A at 440 cycles - with C at 264 cycles below it and the C¹ above at 528 (c.f. Ill. 1-20 with Ill. 1-46). Certain orchestras use an even higher Middle C. However, in this book we must stay with the traditional C-C¹ at 256:512 (as in Ill. 1/46) and all its related interval numbers, since they are the *actual* vibrations, a Law of the Cosmos as it actually is as demonstrated by Pythagoras through simple whole numbers with physical media and immediately testable through the human senses.

On the other hand it is understandable how the concept of adjustment does have a practical basis. If an instrument like the piano was tuned exactly according to true intervals, an inbuilt *untuning*, or interval slippage, would occur over several octaves, the reason for which is fully explored in Book 13. In a harpsichord, for instance, whose charm

partly derives because it is as a rule *untempered*, you can observe how it becomes increasingly difficult to harmonise a chord stretching across more than three octaves because their intervals imperceptibly move farther away from the pure ratios involving the first 9 integers, a clear-cut constraint on composers for that instrument. So this is natural too, and tempering is a device to avoid that gradual natural breakdown from total cohesion. It is, therefore, understandable in many ways that ‘tempering’, or artificial tampering, should be tempting and it is an intuitive judgement whether to keep strictly to natural law or adjust it in the name of a wider general, though artificial, concordance.

Daniélou gives a great deal of consideration to how the denaturing of (or attempt to improve) the modern octave began, by turning to the ‘Scale of Zarlino’. Zarlino lived in Rome 1540-94 and as far as Daniélou is concerned the scale he used as his reference line (as we use the Pythagorean Scale as ours) was ‘conspicuously inaccurate’. He says of Renaissance theorists: ‘After numerous attempts to adapt an incomplete and ill-understood Greek theory to an altogether different musical practice, the scale which was to be the basis of western polyphonic and of orchestral music was finally established by Zarlino, on the ruins of popular music’. If Daniélou did not approve, neither did another great French writer on music, Fabre d’Olivet, in *La Musique Expliqué comme Science et comme Art*, whom Daniélou quotes: ‘In Zarlino’s Scale, of seven diatonic sounds, only three are precise [true]’, which again reminds us of the saga of the tuning of the peal of bells mentioned earlier. Both place his scale against the Graeco-Hindu (Pythagorean) fundamental scale, Daniélou proving by numbers where the ratios have slipped (third row) in comparison to the true ones (second row):

C		D		E		F		G		A		B		C
(1)		9:8		5:4		4:3		3:2		5:3		15:8		2
1	9:8		10:9		16:15		9:8		10:9		9:8		16:15	

Ill. 1 - 44: Slippage of ratios (3rd row) of Zarlino’s Scale compared to the Pythagorean (2nd row)

The use of Zarlino’s ‘slightly off’ scale was superseded by the ‘equal temperament’ (also known as the ‘well-tempered’) scale, introduced by Bach’s contemporaries in order to make it possible for many different kinds of instrument to all play together in all twelve different keys. In other words, what Zarlino began, those who devised the well-tempered scale completed. As early as 1570, lutes and guitars were tuned in equal temperament, and so were some keyboard instruments (usually harpsichords).

Equal temperament has, as its name suggests, all its intervals equal, regardless of the fact that they are all thereby slightly out of tune with the harmonic series - in other words, no longer exactly in accord with the natural scale of Pythagoras as it happens in the Universe: the tempered scale is best expressed by the 12 chromatic semitones given to the seven white and five black keys on the piano keyboard, just as the previously naturally unequal space taken up by large or small constellations of the sky were by the astronomers tidily allocated 30° sectors in the well-tempered Zodiac! Daniélou in his **Introduction to the Study of Musical Scales** correlates the chromatic scale with the zodiac and the seasons of the year (Book 7). Sir James Jeans in **Science and Music** likened them to the clockface, since it not only matches the succession of 12 Signs but also the 12 hours of the night or day and the 12 months of the year (which used to be the the Signs). The implication is that we should not denigrate the 12-fold division of the Octave out of hand, since it is a system in its own right offering several important anchors for integrating natural measures, given that 12 is divisible by 2, 3 4 and 6, and therefore in a position to link the Greek Lambdoma to the Sumerian Sexagesimal System and the 36 Decans (Veil of Isis 6, Book 9).

In western systems today, small differences in the accuracy of intervals are of minimal importance to the majority of musicians who have moved with the times and indeed experimented with music of even more discordant intervals - even though to the natural ear the perhaps initially pleasurable shock afforded by music played on the equal temperament scale, let alone modern music, is very soon sensed as unsatisfying, and even unpleasant. The attitude of the present day is to tend to try and *diverge away* from the true notes of the octave, since keeping to its principles is considered old-fashioned. The heartless delimitation of an octave where most notes are off the true wavelength means it does not activate the full resonance of the human soul, cheating it of its full measure and giving it bad habits of perversity. Since at the outset we invoked the Ouroboros as the binding theme for the Cosmokrator books by letting the extremes of ancient and modern look at each other, it is about time to bring Pythagoras back, and let the New mouth devour the Ancient tail, close the circle and harmonise the human perception of life once more. We should bear in mind, too, Anne Macaulay's argument that the Pythagorean Scale was not imported into Europe from the Graeco-Roman world in the Middle Ages but all along had been native to Northern Europe at least as far back as the Stone Age whence, indeed, it came to Greece. As we explain fully in Book 11 on Architecture, it is on record several times that Classical writers regarded Britain as the Hyperborean source of the Apollonian tradition (we is Druidic) - based on the concordance between the harp, astronomy and geometry. The bardic aspect of that culture based on what we now know as the Seven Liberal Arts survives in Wales today at the Eisteddfod. Let us look more closely.

THE OCTAVE AND THE LAWS OF CORRESPONDENCE

Marsilio Ficino wrote to his friend Amerigo Corsini, ‘The same likeness that compels one man to love another also leads the other to love him: for, as we experience every day, when two strings or lyres are tuned to the same pitch, whenever one is plucked, the other vibrates’. His long **Letter on the Lyre** addressed to Antonio Canigiani is quoted in Book 7. Ficino understood that the music of a human soul can be discerned through resonance. When people instinctively respond to a person’s presence it is to their invisible soul harmonics - which sensitive people see expressed also as their coloured aura.

*Look again in Ill. 1-19 at the links between speech, colour, length and Number: they underpin the Liberal Arts. This is a foundation so important that you should make your own version, filling in the colours with paint! (To get the colours tuned accurately, look at the table for Cosmokrator’s Colours on www.cosmokrator.com.) Consider also how, even today we consider the Seventh Day the Day of Rest, just as in the Ancient Near East the Seven (Sibitti) were holy, and treated as a collective God, so that the Seventh of anything was considered special. This spread to Greece, so that every Seventh day was devoted to Apollo! In other words, the Babylonians saw the Octave as a God (see **Book 7A** for the amazing detail of the Babylonian world of correspondences seen between plants, animals, colours, events etc.). Not until we cover Astronomy in **Books 7 & 9** will we understand why the seven-fold nature of the week, and of other sequences, is inevitable!*

In a way Pythagoras was not as important for pinning down the numerical nature of octaval resonance whose numbers we have analysed above, as for demonstrating how CORRESPONDENCES, or AXES CONNECTING LEVELS OF REALITY, work. The most obvious we have already introduced, adding in metals and process sequences as two more out of hundreds of further possibilities. The basic ones given in Ill. 1-19 are the ones people do not argue with having imbibed them from the very start of their life. Most of us already take for granted the concordances between colour, musical notes, Number and the days of the week - even if the line-up of vowels and planets may not be as familiar as they used to be - since in ancient times everyone took these matches as unquestionably in the nature of reality. By first showing how each note of the octave can be given a number according to its place in the sequence, it is then possible to place similar sequences from other levels of reality in the same order under each other, so that they key into and echo each other by virtue of the position they have in common down the vertical (if this was not true, our table in Ill.1-19 would make no sense).

The great insight of Pythagoras’ teaching, then, is seeing that colour changes along the spectrum are like each day of the week, each with its own quality, in just the same way

that notes progress along the octave. If we look more deeply into Pythagoras' *sources* we find the teaching of the Law of Correspondences is far older than his well-known, more systematic rendition, for Babylon was there centuries before him. It is the infiltration into Greece of Babylonian thought (its records go as far back as 4/3M Sumer) that we derive our seven-day week, talk of the seven vowels, and impose seven colours onto the rainbow.

Donald Hatch Andrews writes that the presence of colour can be described as frequency just like heat or thermal agitation, so that different octaves give off different amounts of heat, and different notes of one octave give off differing frequencies in vibrations ranging in the middle-range octave between 3800 and 7600 Angstroms (some blind people can tell colour with their fingertips because of this). Red is the slowest frequency and violet the fastest. Colour becomes lighter and more transparent the higher the octave and at a certain point all colour merges into white light. Andrews offers a 'scale' of colours which, like ours, begins with Middle C at deep red and ends with violet at B.

Note that added to the sequence of colours in our definitive Table of Correspondences in Ill. 1-19, flanking the sequence of the rainbow are the nothingness and silence of Black at its beginning, and White for wholeness and completion at its end. Black contains all colours latent within it, whilst White could also be painted as a mother-of-pearl iridescence containing all the colours in perfect balance, whose number is 8. I have put 8 on its side as the symbol for Infinity to denote that it overlaps the 0 on the first column providing a never-ending new beginning (see the last two illustrations in this book which beautifully confirm this). In other words, the end is never the end but a new beginning. In Big Bang terminology, if Black/Silence is antimatter, the colours/sounds are the manifestation of the world over seven phases (the Seven Days of Creation) and the return to the beginning at 8 is the full display of matter which has come to completion at White before, at that very juncture, it returns to antimatter to start another cycle. Whether the timescale is vast, or takes place in the wink of an eye, the *process* is the same. In other words, although there may seem to be a beginning moving to an end-goal, Ouroboros-like the head bites the tail to form a repeating cycle at Infinity/Zero (Ill. 1-47). This important process is explored in Book 13 but we have a taste of it in the last few illustrations in this book where colour and music are seen in circular or spiral form, possibly at specific angles.

THE SEVEN SACRED VOWELS

In our basic Table of Correspondences at Ill 1-19 the alignment of the vowels to Octave is also shown. Originally for ancient Greece these would have been the Ionian vowels of A E H I O Y Ω - an anonymous Gnostic text says:

The seven vowels celebrate me, who am the imperishable God; indefatigable Father of all beings, I am the indestructible lyre of the Universe; it is I who found out the harmonious concord of the heavenly whirlwind.

The Seven Vowels were sung as the innermost secret of the Greek Mysteries, on a par with the secret name of God for the ancient Semites if the whole sequence was uttered as a word - a name held to be unspeakable, so powerful was it. Learned books have gone into the full detail on this (which we shall do when we come to the Seventh Veil itself in a much later book), but if you whisper to yourself the order of the vowels from Ill. 1-19 it is sufficient to hear hidden within it both *Jahweh* and *Allāh* (not so distant from the name of *Apollo* itself) - and *Rūḥ*, the word for the Spirit of God. *Alleluyah/Hallelujah* are variations on these names. Remember also that *Ḥayy* in Arabic means *Life* and *Ḥawā* in Arabic is the name of *Eve*, the female half of the manifesting Godhead. As time passed, different traditions emphasised different vowels, but I have kept to our own Brito-Atlantean (Druid) tradition of the order of the vowels as A E I O U as we still learn it (I hope) at school.

To fill out the full octave I have inserted the half-vowel/half-consonants allowed both by the Indo-European and Semitic tongues - of **Y** (a thickening of E and I) and **W** (a thickening of O and U). **R** is the Irish R, still strongly Indo-European even today, where the voice is sounded as the tongue points up to the roof of the mouth but does not touch it (try it - this kind of R is not a consonant since the tongue stays there, rather than moving away). If the tongue goes on to touch the roof of the mouth in the same way, a latent **L** emerges, and that is why I have in brackets put L after the R because this helps to understand the hidden Allāh/Apollo within the vowel sequence (P is likely originally to have been W). Finally, **H** is extremely important in Semitic languages because it is pure breath without sound, like a final expiry before cessation/death descends, bringing the series to a new silence and a new beginning at the onset of the next octave. We shall fully consider all the sounds of language and their alphabets in Book 8 but having looked more closely at the implications of sound, colour, language, number and astronomy in relation to each other, we are in a position to look at the traditional School Curriculum, eternally valid and usable today.

THE WESTERN TRADITION AND THE SEVEN LIBERAL ARTS

The Pythagorean Scale, *as the key to the worlds of correspondences* is the foundation stone of the Western tradition and historically the most often quoted and retained in Europe - even if today society as a whole has lost the vision to live by it. Just as a body cannot operate legs and arms without a spine, a curriculum without that backbone means that even adults can no longer see an intelligible order to things, let alone children. If, according to Dryden's lines, humanity is the crowning Octave of the Creation, then

obviously humans should, singly and collectively, understand all the previous octaves out of which they have emerged. The practical way of putting them into practice is by the use of one or several of the forms of knowledge provided by the Seven - some say Eight - Liberal Arts - traditionally these disciplines are:

NUMBER (ARITHMETIC)
MUSIC
GEOMETRY
ASTRONOMY & ARCHITECTURE
GRAMMAR
DIALECTIC
RHETORIC
PAINTING/THE VISUAL ARTS

[the latter included on the special pleading of Leonardo da Vinci] (see Book 9)

All are personified in Raphael's well-known painting in the Pope's Vatican apartments:



Ill. 1 - 45: Raphael's School of Athens, illustrating the Seven Liberal Arts

The **School of Athens** illustrates the key exponents from the ancient world of the Seven Liberal Arts, in an architectural setting overseen by statues of Apollo and his lyre in a niche on the left and of Athena, Goddess of Knowledge, on the right. In the foreground seated at the left Pythagoras himself expounds the Harmonic Series (**MUSIC & NUMBER (ARITHMETIC)**), its arcs drawn out above the Tetraktys on a slate held at a slant by a disciple. He is balanced on the right by Euclid bending over to trace a geometric exercise for his gathered pupils (**GEOMETRY**). Standing behind Euclid's clique are both Ptolemy and Zoroaster representing

ASTRONOMY (we shall explain in **Book 10** why in the Hindu Tradition Architecture was understood as part of the discipline of Astronomy - we are told Raphael's uncle, the architect Bramante, posed as Euclid for the painting). On the upper dais at the very left, a long-haired youth runs on with artist's materials strapped over his shoulder, standing for **PAINTING & THE VISUAL ARTS** being admitted as a latecomer to the gathering. At the very centre of the composition stand Plato holding his **Timaeus** and Aristotle holding his **Ethics**, debating with each other (covering **GRAMMAR, DIALECTIC AND RHETORIC**) on the nature of the Cosmos and whether it is underpinned by Sacred Number (Plato points heavenward) or not.

The educational method is that through their practice - by simply counting, measuring, making music and communicating, human beings, despite any limitations they are born with, realise their potential, and are thus liberated. Some naturally curious people like you and me, who even today see no split between Science and Art, want to know how these varied subjects in the ideal school curriculum - colour, sound, shape, language - all connect and synthesise, and for this we need to understand the Laws of Correspondence which we hope will unfold as this and later books proceed. There have been revivals of the conscious use of the Octave of the Arts from the Druid Stone Age by Pythagoras in Ancient Greece. Then after its apotheosis in the monastic life of the Gothic Age at Schools like Chartres, during the European Renaissance understanding of the Pythagorean Laws of Number was not only re-'Greeked' but given a Platonic philosophical dimension, when the healing powers of Apollo's lyre were evoked once more by the Florentine translator of Plato's works, Marsilio Ficino. His patrons were members of the art-loving de' Medici family who by adopting Pythagorean harmonics as the basis of their own life fostered the pursuit of the Liberal Arts throughout Florence, then Italy and finally Europe (the English Grammar Schools were founded on such a curriculum).

When Daniélou, the great western yogi of the twentieth century, wrote that the Pythagorean scale is 'the equivalent of the Western major scale and also the Hindu Raga *Bilaval That*', calling it the Greek-Hindu Mode, he went on to say 'this interpretation ... should be correct for our times', implying that the Pythagorean numerical scale can adapt itself to 'diverse interpretations' in accordance with different eras of humanity. Surely it is time once more to revisit such knowledge, which is never out of date.

MUSIC AND GOOD GOVERNMENT

What is it about the seven basic notes of music which gives them the status of ultimate law, providing the key to Good Government, as Plato expounded in **The Republic**? Pythagoras' teaching was the basis in 5C BC Greece of Plato's Academy, out of which such philosophical ideas about the ideal State were discussed. In **Timaeus** Plato made explicit

many implicit aspects of Pythagoras' apothegmic teaching, such as the numbering of the Lambda, explained above, but his analysis then went on to explain *the formative effects of music on the shaping of character*. **The Republic** then applies the theory of **Timaeus** to how Good Government runs in the perfect kingdom, or state: 'Beauty and ugliness result from good rhythm and bad... and good rhythm is the consequence of music that suits good poetry, bad rhythm of the opposite... rhythm and harmony penetrate deeply into the mind [and therefore society]'. Obviously the most desirable leader will be a Good Man running a society living on harmonic principles, so Government will be sound because based on them!

Daniélou explains that classical Hindu music builds a complicated melodic system based on the 'seven sounds', known as the Seven Rishis which, although given by the seven main notes of the octave, are then subdivided amongst themselves into 53 intervals (See Book 13). He then shows that ancient Chinese music emphasised different microtone combinations from those of the Hindu system, limiting themselves solely to a 'cycle of fifths' which was central to their cosmology, though again as theoretical background, their scale could be broken down into 60 *lyu*! Cultural differences show, too, in the division of the colour spectrum - by some peoples into 7, others into 6, and yet others into 5, or even 4, again dependent upon the significant cosmological numbers for that culture as well as the main colour character of their environment! In the Western tradition 7 is the cosmological number inherited from Babylon to which the spectrum was to conform (Newton in his famous experiment of splitting light actually saw six distinctly different colours, but cultural preconception being paramount subdivided only one of them - purple - into indigo and violet to make the Seven colours to make an Octave.

The Chinese kept to their cycle of Fifths because the purest harmonies in sound ratios are limited to the numbers up to 5, being the ratios of 2:1, 3:2, 4:3 and 5:4, and are the smallest prime number ratios (referring to Ills 1-21 and 1-25 for a reminder). Of course precision in these ratios must be true for the exact effect, and according to Daniélou in Part IV of his **Introduction to the Study of Musical Scales**, it was even held by the Chinese that 5:4 (the fifth harmonic) was no longer quite in tune with the fundamental tone (C in our case). Thus there was a convention in ancient China that the number 5 was the absolute limit of consonance possible, or permissible. They placed enormous emphasis on this principle and their reason for laying it down, though not expressly said, was in the cause of retaining order and harmony between Heaven and the State. Each interval with number ratios beyond 5, because progressively more discordant, as anyone who tries smaller interval note ratios can hear for themselves, became unacceptable for the workings of any great civilisation.

Such a view was also held in mediaeval Europe, where, also, ratios above 4 were usually not used, as for instance in Plainchant. The argument for the idea that the first dissonant harmonic (the seventh) could be associated with evil was explained in the writings of Louis-Claude de Saint-Martin in the 18C who said it contains a dissatisfaction and yearning for resolution which even if reaching a kind of closure, can never be final. Langston Day explains: 'The chord to which it resolves will also contain its own seventh harmonic, its own discontent, like the seed of evil and disharmony present in every being. If we were to sound that note in the above resolution it would be to insert an E^b into the chord at F, thereby requiring a further resolution to the chord a fifth lower, on B[#]. And so the process would continue indefinitely, spiralling without hope of redemption through an eternal geometric series of ever lower fifths, into a hellish realm of double flats where no musician likes to venture'.

Since the Chinese, Hindu and Christian musical systems were intimately bound up with their cosmological and philosophical systems, keeping to the lowest number ratios provided the means for true correspondences to be set up between different levels of existence, and hence for effective *religion* which, by definition, *reties* the connections between the divine and the physical, the diapasons between each note of the heaven and earth octaves, as Dryden's poem says. Good Government must therefore be concerned with aligning such levels of existence: 'The music and literature of a country cannot be altered without major political change', said Plato, who stated that plain music produced discipline. 'Discipline is a kind of harmony', he said, and once citizens and their children 'lose their discipline, it becomes impossible to produce good, orderly citizens'.

It goes without saying that governments today do not concern themselves with music and its effect upon the governability of their people. Ignoring accuracy in the laws of harmony has, Plato would say, led directly to bad Government and social unrest which is the direct responsibility of each nation's leaders. As we explore in later books, this is just as true of the effect of decadent visual arts on society's discrimination (what can we say about the commensurability of Tony Blair and his promotion of Britpop at No.10 parties, or of David Dimbleby's adulation of Gilbert and George, Tracey Emin or Damien Hurst in a recent TV series)? Quite apart from that, society consists of such huge numbers of people, as Guénon points out in **The Reign of Quantity**, that a very different kind of government is required to regulate it anyway when compared to the small numbers involved in the ideal Republic Plato envisaged. The taste of our leaders on this score is a major cause of the malformation of the average profane person today. In the past, the simplest hymns and folk tunes of ordinary peasants, using those first harmonics of the pentatonic scale, kept

the common man and woman at a level of decency now distorted by the cacophony of modern misrule. As in some fairy stories, people may instinctively feel their souls have become misshapen, but due to lack of criteria - which we are here trying to establish - cannot understand where things have gone wrong. Those responsible for healing mankind in the new era can do no better than start with wholesome music (and I do not mean by that *dull* music) and get people to sing and play live music together.

Two evening gatherings I attended had a profound effect on me. At the first about 40 of us sat in upright chairs and listened to a live performance of a Mozart violin concerto which transported us to a golden realm of harmony which stayed with us for the rest of the week. The other was a gathering of the top directors and their assistants at a company headquarters guest house where a disco thumped out its beat at an unbearably high decibel level, so that I simply ran away to my room for the rest of the night. The litmus test was the effect each kind of music had on me, and my opinion of the persons in charge of choosing these two kinds of music placed them in a corresponding Dantesque high or low level of respect!

MODERN COMMENTATORS ON THE PYTHAGOREAN SCALE

There are good cosmic reasons, then, that the natural measures which will unfold in full detail throughout the rest of this book can only be demonstrated by keeping to the Pythagorean Scale as the background Norm. It remains the one truly acceptable musical system for the West because it expresses the absolutely basic harmonic series to be found underlying every echelon of the natural and cosmic world order. As part of his comparison of the three main systems of musical scales (Greek, Chinese and Indian), Daniélou gives this particular scale close attention and analyses its components in relation to an even more radical subdivision of the octave into 301 microtones known as *savarts* (a modern electronic unit of division - so far the most minute breakup of the musical octave made possible within range of the human ear - as follows:

NOTE	C		D		E		F		G		A		B		C
Frequency	256		288		320		341		384		432		480		512
String Stoppage	1		9:8	10:9	81:64	16:15	4:3	9:8	3:2	10:9	27:16	9:8	256:243	16:15	2
Interval Ratio		9:8		9:8		256:243		9:8		9:8		9:8		256:243	
No. of Savarts		51		51		23		51		51		51		23	

III. 1 - 46: Savart intervals between notes showing pinch points between E/F and B/C¹

Looking at the ratios of intervals between notes again, whether in terms of Pythagorean numbers (Ill. 1-44) or Indian Savarts, the phenomenon of the two bottlenecks points of the octave spotted by Gurdjieff as the hallmark of the natural octave show up again.

Another masterly analysis of the Pythagorean Octave, this time by McClain, bears out Daniélou's yoking together of the Greek and Hindu traditions. His **The Myth of Invariance: the Origin of the Gods, Mathematics and Music from the R̥g Veda to Plato** (note the affinity of the words R̥g and Raga) brilliantly equates sequences of musical scales with the powers of Hindu and Greek Gods such as Śiva, Indra or Śrī Mātā, the Great Mother, as well as with Greek and Hindu cycles of history and the Atlantis myth! This is not a book for the faint-hearted, and without the foundations given in this book you will fail even in the foothills to keep up with this intrepid K2 music-mountaineer!

Along with Kayser, whose further work on Pythagorean music we look at shortly, Daniélou and McClain exhaustively studied the behaviour of the Pythagorean resonances and related musical traditions. Both refer the calculation of intervals in the Pythagorean scale back to a study of Plato's *Timaeus* where the interval number are given as 9:8, 9:8, 256:243, 9:8, 9:8, 256:243 as in the second row of the table above. They are the outcome of the numerical series given by Plato (combining the distribution down the *Lambda*) as

1 2 3 4 8 9 27

which can simply be understood as the squaring (or doubling) of numbers from 1 on one side (in bold in the series above) and the cubing of numbers from 1 on its other side. These numbers, wrote Plato, are the Seven Powers behind the creation of the entire universe. It is by pursuing this process of doubling or cubing further along either limb of the *Lambda*, by zig-zagging from one side of it to the other, that the series gives rise to the Pythagorean ratios of 3:2; 4:3; 9:8; 27:16; 81:64; 243:128 and 256:243 as shown in the table. The wonders of the *Lambda* are further discussed in Book 12, *but for the time being you could draw out a large one for yourself and starting with Ills. 1-26/27 as your guide, carry the doubling and cubing further down each limb - with a calculator if you wish - until you arrive at 256 - you will take them even further in Book 12.* Now you will get the idea of how the ascending order of the numbers in the ratios are read off by zig-zagging from one side of the *Lambda* to the other. The Greek grouping of the ratios were given a slightly different emphasis from Daniélou's: 27:26 was 32:27 and 81:64 was 128:81, and so on. The difference, says James Jeans, may be due to the fact that the Greeks probably calculated their ratios by string-length and did not know about frequency as such, even if their theoretical mathematics was sound. But, as you will notice, there is no

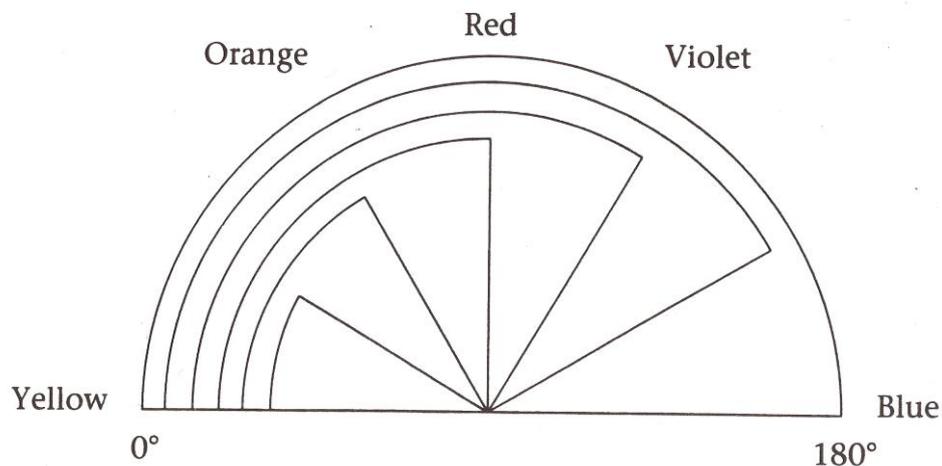
difference in the actual figures involved: only in their pairing from one side of the *Lambda* first rather than the other!

With the revival of the Pythagorean scale during the Italian Renaissance came some wonderful diagrams to illustrate the ratios of the monochord, as, for instance, in the work of Robert Fludd (Ill. 0-29). The Latin name for each note used in Mediaeval times for the intervals were given back their Greek names and reassigned to the Muses, presided over by Apollo, God of Universal Harmony and Wholeness (See Book 9). Since each note was assigned to a planet, the centralisation of the whole system around the Sun is symbolised by Apollo who was thus identified with that planet though in fact his true role is vaster, being the Coordinator of all notes into a universal, beautiful interaction - that is why he is the God of the Octave, of Harmony, and therefore of the Arts and of Good Government.

Even though the Pythagorean scale is seen as the foundation of the Western Tradition, Daniélou considered it also to underlie both the Chinese and Indian musical systems because they, too, are true to the cosmos, and the Pythagorean scale is the essence of universal law into which other sets of sub-law can slide if sub-divided on organic, rather than mechanical, principles. From the point of view of science, according to the laws of physics there are dissonances in the size of intervals in matter which are themselves part of the overall picture. In his chapter on harmonics in physics, Herbert Whone observed, 'the seven tones of the octave can be seen to order themselves simply by the mathematics inherent in the ratios of the intervals'. In other words, the main groundswell of phenomena is Pythagorean, revealing beneath the froth of dissonance the simple whole numbers of music - hence the title of McClain's book, **The Myth of Invariance**, since the Pythagorean scale is a constant of the universe. Whone saw that, in terms of light measurement, whatever the confusion of light effects, the main divisions of the spectrum into 7 were natural, as of the octave into 7 notes, where all tones/colours are related 'by their ratios to the root notes'.

On the other hand, if the smaller parts spinning off the prime octave are themselves to be codified, as we have already discovered, Whone then stressed the real difficulty, if the Pythagorean scheme was abandoned, of trying to divide up the octave in other ways while retaining harmony between notes. If consonance between parts is the aim, and of course it usually is, then for instance, 'equal interval proportions are not possible: we are faced with the fact that at two places the intervals have to be smaller... and the resultant semitones can be graphically represented as bottlenecks' (already made much of by Gurdjieff and Ouspensky). 'If', says Whone, 'as we are claiming, there is nothing arbitrary in the physical world, and the ratios of aural sound have a correspondence with the ratios

Living in Germany, it was the abstract painter, Kandinsky, who had his own less orthodox ideas about the angles of colour which can be summed up in the diagram below:



Ill. 1 - 49: Summary of Kandinsky's theory of the angles of colour

The composer Schoenberg was his friend, but we do not know if he was also interested in Pythagoras, and his colour angles do not match significantly with Kayser's note angles.

THE REDEMPTION OF MATTER BY SOUND

Hans Kayser was the main twentieth-century musicologist, along with Daniélou, McClain and others, to undertake far-reaching work towards understanding the nature of cosmic harmony in all its manifestations. It is difficult to obtain his work in English, and only his key work, *Akroasis* (Greek for *Hearing*) is now translated. Kayser lived for many years in Switzerland, and most of his work was published there in German by Schwabe Verlag. Since his death in 1964 his work has been kept in public view at the Hans Kayser Institute in Vienna by Rudolf Haase. The musician, Berendt, whom we quoted earlier, gives due recognition to the inspiration of Kayser's work in *Nada Brahman* which cross-references Pythagorean harmonies across disciplines from the point of view of a jazz musician (his bibliographies, incidentally, consist entirely of records, tapes and CDs!).

Akroasis encompasses Kayser's life work and shows how harmonics by their very nature go far beyond music to permeate every aspect of existence. He believed knowledge of harmonics could form the basis of an entirely new way to approach scientific research, especially in those fields where an overall pattern eludes the observer. Harmonics, he points out, derives from the Greek *harmonikos* whose root means 'fitting together well' - a concept applicable to an understanding of natural and man-made forms. It implies an understanding of right proportion from a utilitarian point of view, as much as from an aesthetic perspective. The entire culture of the ancient Greek world from the 6C BC was founded on the interpretation of the word *harmonikos* which in the Pythagorean definition

signifies ‘the science of measure (number) and value (tone)’. In **Akroasis** Kayser states, ‘We need only recall the importance of music in Greek education and the close relationship of music to Pythagorean mathematics to understand that the first philosophical theory of the educational effect of music would have to spring from insight into the laws of numbers in the world of music’. This we have already seen for ourselves as the book has progressed.

Following Pythagoras, Kayser demonstrates further how his principles can be applied in every sphere of life. They open up a new world where all strictly conform to cosmic law rather than human convenience which he compares to the tight system of jurisprudence established by Solon at Athens in the 7C BC. Whereas Anaximander had viewed the universe as a cosmos of things of undefined substance without limit, the Pythagorean view, writes Kayser, sheds light on the structural formation of cosmic law itself, arriving at the conclusion that the principle of the cosmos must be nothing other than harmonious, otherwise nothing would exist for very long. Ultimately these are principles preceding vibrational activity, and are therefore the code for the structure of all manifestation. After all, as science has corroborated during the twentieth century, everything in existence is made up of combinations of different frequencies of vibration pulsing in waves, even if not perceived by its practitioners as originating in the Principial Realm of Number.

After Pythagoras and Plato, Kayser describes how the Greek philosophers Democritus and Archytas wrote works on harmonics which have been lost; then Vitruvius the renowned Roman architect in **De Architectura** made sketchy references to the Pythagorean Canon of Proportion, taking it for granted at the time that most architects were brought up on it with no need for him to spell everything out. The idea of designing architecture based on Pythagorean harmonics (Book 11) runs right through the Graeco-Roman tradition, and with its revival in the Renaissance the approach was kept alive by designer-theorists such as Alberti, Serlio, Palladio and Cesarino - who influenced painters (Book 10) and sculptors as well as architects. Since the Pythagorean harmonies could be confirmed in the disposition and behaviour of the solar system too, Ptolemy’s **Harmonia** with its commentary by Porphyry was said to have inspired Kepler to write his **Harmonice Mundi (World Harmonics** - see Book 9), which led to the discovery of his famous Third Law of harmonic calculation which derived from the musical fabric of planetary and stellar movement in its theoretically ideal circular form before it unfolds on the physical plane in elliptical orbits.

Since, as we have demonstrated in this book, harmonics is based on the relation established by Pythagoras between sound and string-length, where the string is taken as the mode of measuring proportional change, the rules can be applied easily to

understanding (in Nature) or making (in Art) the dimensions of the physically visual world. As Kayser proceeds to emphasise, as for the entire Classical Tradition ‘qualities (tones/notes) were derived from quantities (string or wave-length) in an exact way’. Thus quantities (material objects), measurable in terms of string-length ratios, embody direct value and spiritual meaning for the human soul. Thus the Pythagorean perspective, Kayser says, reveals the principles of measure and meaning in ‘a miraculous union’ with material objects, so that form and content are in reality one and the same.

This means, says Kayser, that music, or the experience of sounding numbers, is a potent activity since it can reactivate the physical environment. Qualities of proportion are materialised in matter as a sound or a physical form, and the realm of Spirit and Idea become anchored in harmonic shapes and forms. A bridge is made between being and value, world and soul, Matter and Spirit, through the evocation of Pythagorean Number. Once the correspondence between the visible and the invisible is recognised we can understand why the Greek approach and its application to the formation of the interlocking parts of great architecture, sculpture or painting (where colour is also brought in) still has an immediate impact on every modern person seeking spiritual nutrition at ancient Greek temple sites and in museums. We still react to the art of ancient Greece and the Renaissance with awe and joy because the Pythagorean principles they embody act as potently on us today as they did in ancient Greece - and 5000-12000 years ago when those same proportions were used by Stone-Age Man in the laying out of the stone circles of Northern Europe in accordance with the movement of the heavenly bodies (Book 11). Quality, the experience of aligned vibration, is derived from quantity (the disposition and form of material objects) *if* the quantities fit in harmonic ratios with each other - this is the message of the Pirsig’s cult book **Zen and the Art of Motor Cycle Maintenance!**

Kayser’s detailed analysis of the implications of Pythagoras’ thought therefore points a way out from our materialism, for we are not really ‘thing-obsessed’ but in our heart of hearts simply searching for those forms which will take us back to union with Heaven (that invisible realm of Order). From what he cites in **Akroasis** he judges that the modern loss of accord between numbers and value took place gradually over the centuries but accelerated in modern times for various reasons. Today our burgeoning technologies, unchecked by cosmologies, have turned our lives into an Age of Quantity, as the great modern French thinker, René Guénon, spotted. He writes in his book of the same name that, where numbers are simply quantities or statistics, disconnected from Number in the Pythagorean sense, they are to all intents and purposes dead in relation to the Divine because they bear no relation to beauty or harmony. People have phone numbers, fax numbers, National Insurance numbers, Passport numbers, ID numbers, bank account

numbers and an array of credit card numbers. Statistics pour out in official and media publications without being part of a significant pattern: if they fit into a scheme at all it is at highly dissonant interval ratios of millionths or billionths, placing them in the outer darkness near the borders of Chaos where, as the Bible says, 'there will be weeping and gnashing of teeth'.

Because Principial Number has sunk beneath a cloud of multiplication, the resultant psychic split between modern mankind and its traditions has caused untold cultural breakdown. Unlike Daniélou, who saw its beginnings in the widespread adoption of Zarlino's Scale, Kayser believed, as did the Renaissance thinkers, that the process started as far back as the time of Plato's contemporary, Aristotle, tutor of Alexander the Great, who described only physical phenomena, taking for granted that the world of Principles lay behind them but feeling no need to make direct connections with it, so that his disciples began to deal with nature's phenomena as self-sufficient. This approach is perpetuated - with notable and grand exceptions - by the material- perspective of modern scientists who keep to their speciality without being able to see how it may be a particular manifestation of root principles.

This is why Raphael's **School of Athens** shows Plato pointing up to Heaven, and Aristotle to the physical world before him. As long as we have Number in mind, then quantity need not worry us; as long as we have Pythagoras, then Schoenberg can almost be borne as a contrast: and as long as we know Plato, Aristotle can be put into his place. The two tendencies of perfect harmonisation up the line to the top, and disconnection on any one plane, need each other. Aristotle needed Plato. We need the scientists, even if they don't know they need Pythagoras. Everyone knows that if they are to move forward on any work they do lose sight for a time of the bigger picture as they go down a mental mineshaft to dig at some area of detail that simple has to be worked out in its own terms first. No woman knitting a Fair Isle jumper with its elaborate patterns worries about the fact that mid-way it looks a mess. By counting and keeping to the line-up of stitches from row to row the overall pattern finally emerges. Whether it is carpet weaving row by row with all the colours of the rainbow, unravelling the coding of the Human Genome or understanding and applying the law of the octave in everyday life, we have to constantly juggle the contradictions of Spirit in Matter, and here Kayser's observations provide the key to successful exits from the Maze of Matter in the heart of which most of us are trapped.

UNSTRUCK SOUND

We noted earlier how Kayser marvelled at the beauty and significance of the 0/0 outside von Thamis' Pythagorean Table (Ill. 1-28) - that point at which all lines meet in total

potentiality beyond, even, the Creator at 1/1. This state of being can be described as the Ultimate Silence from which everything comes, known in the *Tao* as The Mother of All Things. When we hear sound, we also perceive link to silence. In his **Northern Indian Music**, Daniélou describes the Indian understanding of the music of the universe, taking for discussion an Indian text, the **Sangīta Makaranda**:

Sound is said to be of two kinds. One, a vibration of aether which remains unperceived by the physical senses, is considered to be the principle of all manifestation, the basis of all substance. It corresponds with what Pythagoras called 'The Music of the Spheres', and forms permanent, numerical patterns which lie at the very root of the world's existence. This kind of vibration is not due to any kind of physical contact [friction] as are audible sounds. It is therefore called *anāhata* (*unstruck*). The other kind is an impermanent vibration of the air, an image of the aetheric vibration of the equivalent frequency. It is audible and always produced by physical contact... such as the finger striking the keys of a piano. There is therefore called *ahata* (*struck*) sound.

The **Sangīta** itself says, 'In this unstruck sound the Gods delight. The yogis, the great spirits, projecting through an effort of their minds into this unstruck sound, depart, attaining *mokṣa* (*liberation*)'. Just such liberation was the aim of the European Liberal Arts through the use of physical media such as language, architecture and the visual arts as 'ladders'. It is the harmonic interrelation of ratio and Number in these disciplines which provides clues to the nature of unstruck sound, the latter represented in column 0 by the colour Black in Ill. 1-19.

The concept of struck and unstruck sound pervades the oriental view of the cosmos and its different spheres at all levels. All is vibration and frequency, and from the bird's eye view of 0/0 in Ill. 1-28 they see that only the 'lower' realms of vibration, the physical ones, are perceptible to the human senses. The oriental systems were based on a comprehension of the existence of such levels and there was constant concern about how they connect with each other. The Chinese considered that certain intervals belonging to 'the scale of invisible worlds' cannot be adapted to terrestrial ones. None of this talk of 'levels' or even any one octave makes much sense to materialistic modern man who, because he has lost touch with the higher octaves, does not believe they exist. A study of the writings of Christian mystics leads to the conclusion that they, too, through direct experience, knew a good deal about the realities of higher realms and octaves where all sorts of primal 'events' take place in advance of material manifestation.

Beyond our physical existence lies a sea of relationships whereby the seven notes of the Octave unfurl into varied ordered combinations that conjoin to create the material world and its phenomena. When we study atoms and molecules we will understand some of the minutiae of how this happens. The trick for us in everyday life is to realise that it is our physical life that puts before our very eyes and ears the paths that can lead to those

higher dimensions that all humans are made to experience because they descend *from* them in the first place: ‘those positivistic minds who may smile at such conceptions as “the ratios of the planetary orbits” might’, says Daniélou, ‘be very embarrassed if Saturday did not come every eight days, if the days no longer had 24 hours, if the hours had not 60 minutes...’.

CONCLUSION

This chapter should be enough to point to the importance of music for keeping our souls in shape. I knew a therapist who worked in an asylum who was clairvoyant. He told me he could see how pop music tore the auras of patients into shreds and made them worse: harmonic music of any kind contributed to building up a healthy, well-coloured and intact aura again. I have experienced so many train journeys where a young person has got onto the train with a cacophony of noise screaming direct into their ears, producing a shattering effect on anyone in his vicinity. To abuse oneself to this extent shows a complete lack of civilisation and it produces someone uncivilised - you will have seen for yourself the defiant expression, the hunched body, even an increasingly violent body language. If this is the only way a person can gain relief from the pressures of the everyday world, by totally numbing one’s senses, then this is the complete opposite to prayer, meditation and contemplation, and leads in the end to self-destruction. I have noticed how whole school populations are unable to sing, whether in terms of keeping in tune or cultivating quality of voice. Quite literally it is a matter of life and death to get our school populations singing and harmonised if there is any chance of saving what seems to be impending relegation into a degraded people.

We should really try ourselves to sing and play music since if we only listen we do not develop as fully, because we do not contribute. Interestingly, Marsilio Ficino gave *his* grouping of the Seven Liberal Arts, on which the Italian Renaissance was founded, as:

GRAMMAR, POETRY, RHETORIC

PAINTING, ARCHITECTURE, MUSIC

and the *ANCIENT ART OF SINGING to the ORPHIC LYRE*

We do this by theory and by practice - which is not so easy to do as we might think, for as Leibnitz wrote in the 17C:

Music is a hidden arithmetic exercise of the soul, which does not know that it is dealing with numbers because it does many things by way of unnoticed conceptions which with clear conception it could not do. Those who believe that nothing can happen in the soul of which the soul is not conscious are wrong. For this reason the soul, although not realising that it is involved in mathematical computation, still senses the effect of this unnoticeable forming of numbers either as a resultant

feeling of well-being in the case of harmonies, or as discomfort in the case of dissonance.

In following the Cosmokrator books, increasingly detailed divisions of the basic seven-fold octave rise consciously onto our horizons. We have named these groupings of divisions in a male way as 'Spanners' (because they are so useful) or in a female way as 'Veils of Isis' since they represent layers of the Universe - seen through ancient eyes as the clothing of The Great Mother, which clothe us too! By Book 13 we finally reach the Seventh Veil with its 53/56 or 60-fold divisions as used in Indian Music and the pack of Tarot Cards. The potential for endless constructive subdivision could go on, but there is a consensus that meets the general criteria of what are considered the most uncomplicatedly harmonious groupings validated by long tradition, at the heart of which the Pythagorean Scale is given pride of place as the main root.

We could take our analysis of the numbers and ratios of music much, much further, as David J Benson does in his book, **Music: a Mathematical Offering**, but I think it is better to prove the existence of the basic scale, and leave it to the reader to follow up the further detail if they wish. But once you have the general idea, I think it is more important to spend more time simply listening to good quality music. The idea of sitting in silence to listen to a piece of music deliberately, rather than as a general backdrop to our activities, is almost incomprehensible to the average twentieth century man or woman, but this is how to cross one of the bridges to the world of Unstruck Sound (to clap when it is over is one of the most barbaric acts there could be, since it blots out all the reverberations of the work just played which can continue resonating within the substance of the soul for several minutes, if not hours and days).

If we would only calm down and go back to the *real* basics from a condition of quiet contemplation, all Seven Liberal Arts, with Music pre-eminent, are there to be cultivated and liberate us to higher worlds.

CODA

Just as I had finished writing this book, by whim because it was in a sale, I bought Anthony Ashton's tiny book published in Glastonbury called **Harmonograph: a Visual Guide to the Mathematics of Music**. I straight away added to the Bibliography the 19C books on harmonics which he cites to show that the modern search for the laws I've been describing in fact goes back to the mid-nineteenth century. His introduction tells the story of how he himself got hooked:

Many of the drawings in this book were produced by a simple scientific instrument known as a harmonograph, an invention attributed to a Professor Blackburn in 1844. Towards the end of the nineteenth century there seems to have been a vogue for these instruments.

Victorian gentlemen and ladies would attend 'soirees' or conversaciones', gathering round the instruments and exclaiming in wonder as they watched the beautiful and mysterious drawings appear. A shop in London sold portable models that could be folded into a case and taken to a party....

From the moment I first saw drawings of this kind I was hooked: not only because of their strange beauty, but because they seemed to have a meaning... The instrument draws pictures of musical harmonies, linking sight and sound... it was coming across this book in a library soon after the end of the second world war that introduced me to the harmonography. Seeing that the book had been published by a firm of scientific instruments makers in Wigmore Street I went one day to see if they were still there. They were, though reduced merely to making and selling projectors. I went into the shop and held up my library copy of the book for the elderly man behind the counter to see.

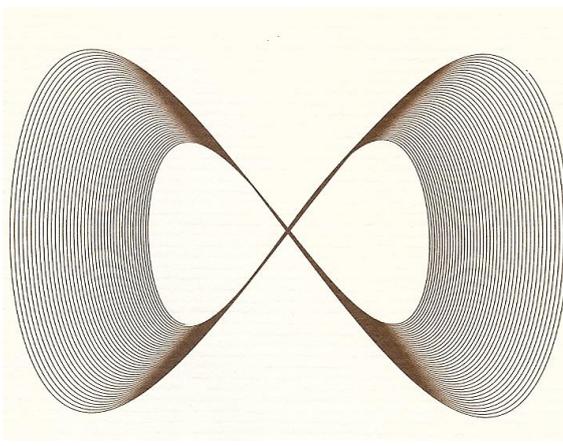
'Have you any copies of this book left?' I asked him

He stared at me as though I was some sort of ghost, and shuffled away without a word, returning in a few minutes with a dusty, unbound copy of the book.

'That's marvellous', I said, 'how much do you want for it?'

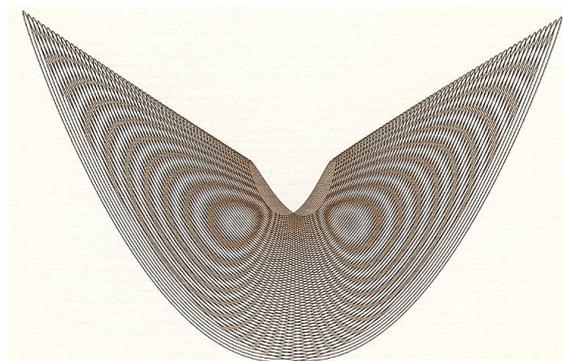
'Take it', he said, 'it's our last copy, and we're closing down tomorrow'....

Appleton's book is full of illustrations similar to those in this book, worth looking at for being beautifully delineated and models of clarity. What really struck me as a confirmation of all we've been saying were the two exercises he made harmonographically to demonstrate visually the Diapason of an Octave (Doh to Upper Doh/C-C¹) first by swinging two pendulums (one at half the length of the second) at right angles at half-timing:



Ill. 1 - 50: Image of an 'Open Octave' harmonograph – from Ashton pp26-7

and then simultaneously.



Ill. 1 - 51: Image of a 'Closed Octave' harmonograph – from Ashton pp26-7