

Cymatics

Insights into the invisible world of sound

Jeff Volk presents an overview of the development of Cymatics and explores its potential to reveal the dynamic but subtle interaction of sound with water and the implications of these effects for the development of the therapeutic applications of sound.

We live in a vast ocean of sound, whose infinite waves ripple the shores of our awareness in myriad patterns of intricate design and immeasurably complex vibrations ... permeating our bodies, our psyches, to the very core of our being.¹

So begins the program, *Of Sound Mind and Body: Music and Vibrational Healing* and so begins this whirlwind account, unveiling the mysteries of sound. Perhaps because it is invisible, less attention has been paid to this sea of sound constantly flowing around and through us than to the denser objects with which we routinely interact. To those of us for whom 'seeing is believing', Cymatics, the science of wave phenomena, can be a portal into this invisible world and its myriad effects on matter, mind and emotions.

The long and illustrious lineage of scientific inquiry into the physics of sound can be traced back to Pythagoras, but this article will focus on more recent explorations into the effects that sound has upon matter. However, a brief sum-

mary of the last three centuries of acoustic research will help to highlight a few of the pioneers who blazed the trail so that Cymatics could emerge as a distinct discipline in the 1950s.

Sand forms, sound forms

On July 8, 1680, the English experimental philosopher, Robert Hooke, broke the visible sound barrier when he spread flour on a small glass plate and passed a violin bow along the edge of the plate. As he continued, he noticed that the flour, rather than just flying off the plate, configured itself into an oval shape, which re-oriented itself along the surface, depending on how he bowed the plate.²

About 100 years later this phenomenon was re-discovered by the German physicist, Ernst F.F. Chladni, known as the 'Father of Acoustics', who laid the foundations for the study of the physics of sound. Chladni (right) devoted much of his experimentation to the phenomena of resonance. In the manner of Hooke's experiments, he spread fine sand on a suspended steel plate and then bowed the edge of the plate. Intricate patterns formed as the sand migrated away from areas of greatest vibration and settled along the nodal lines, or the areas of minimal vibration within the plate. He made extensive drawings of these patterns, which came to be known as Chladni figures.³

His demonstrations to scientists and socialites in laboratories and salons throughout Europe were so impressive that eventually word reached Napoleon, who paid him a princely fee for a court presentation.

In 1831 the great experimental scientist, Michael Faraday, published a paper describing his observations of geometric 'nodal forms' appearing in granular solids under the effect of vibration. Although he was fascinated by these phenomena, he soon moved on to other areas (like electromagnetism) as he could find no practical application for them. But it was not only royalty and men of letters who found this so fascinating. In 1885, an American, Margaret Watts Hughes, a singer and 'devout Congregationalist', began experimenting with the 'eidophone', a small, saxophone-like instrument with a membrane spread tightly over the bell, upon which she spread various powders and liquids. By singing long, sustained tones into this device, she was able to create finely detailed images mirroring the brachiated structure of plants and flowing water, as well as the amazingly complex forms of flower petals.⁴

Jumping ahead to the 1960s, in the small town of Dornach in the foothills of the Swiss Alps, Dr Hans Jenny constructed a similar device, which he called a tonoscope, to transform the human voice into visual 'sound figures'. Jenny's association with the Waldorf school system, which specialized in educating physically impaired children, led him to employ this 'toy' to teach deaf children to speak. Although a deaf child might not be able to hear the difference between a properly pronounced 'oh' and a guttural, poorly articulated 'uhh', using the tonoscope they could see the difference (Fig. 3)!

Although this very simple device was similar to the one created by Ms Hughes over half a century earlier, Jenny did not stop there. He went on to hook up a frequency generator and amplifier to differently shaped, steel plates, animating lycopodium powder (a fine, spherical powder, highly responsive to vibration) as well as a variety of denser pastes and liquids.

This enabled him a much greater degree of control over the parameters of the phenomena, including the ability to repeat specific patterns at will. He, too, was able to produce a variety of structures similar to those found in the natural world. The resulting patterns and flow forms he observed were extensively documented in films and books compiling over 14 years of detailed research. Jenny coined the term 'Cymatics' (*Kymatics* in German) from the Greek *to kyma* (pertaining to waves),

Facing page: **Fig. 1** An 18-element structure: standing wave, 35.1 Hertz.



Top: **Fig. 2** Ernst F.F. Chladni demonstrates 'nodal patterns' by bowing a small steel plate covered with sand. Bottom: **Fig. 3** Sound figures formed on a rubber membrane. Left to right: 'oh', 'ah', and 'oo'.⁵ ©2001 MACROmedia Publishing.

delving deeply into an area of scientific inquiry that had only been superficially explored at the level of effect.⁶

One might well wonder, what is so interesting about watching a mass of powder moving around a plate? Perhaps it depends on your ability to discern patterns, not just in the sand, but in the interplay of sound – the animating principle of vibration, interacting with substance – the dense matter that gives form to these dynamic structures.

It was his analysis of these patterns and his profound insights into their universality that set Jenny apart from previous researchers. Truly a Renaissance man, he was a medical doctor, a fine artist (painter) and musician, an astute observer of Nature and a philosopher of science in the Goethean tradition. He was also an Anthroposophist, having personally studied with Rudolf Steiner. So, needless to say, his perspective was vast! Jenny went so far as to say that wherever one fixes one's gaze, in whatever field of observation, be it astronomy, geology, orology (the study of wave movements within the earth) or in the life sciences, biology, cytology (cell development), anatomy, physiology, embryology ... one may observe the principles of Cymatics at play.

Hidden within the physical formations of standing-wave patterns, Jenny perceived and documented specific processes



Left: **Fig. 4** Wave trains in a layer of glycerin on a vibrating membrane. Right: **Fig. 5** Hans Jenny demonstrating his electronic 'tonoscope.'
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manifesting through the energetic impulse (oscillations) of sound frequencies interacting with matter. For example, he was able to show empirically how certain frequencies within the audible range could create fluid forms, not only in liquids, but also in powders and even viscous pastes. What's more, this previously inert matter, animated by sound, could assume a circulatory motion and would often create life-like, flowing forms, analogous to organs of the body or to complex, living organisms. Viewing his films, one can easily imagine how life forms could evolve from the primordial, energetic matrix, organized by the orderly pulsations of sound.

Effects with water

Another generative aspect of sound was brought to light in these experiments – the creation of a turbulent field that further 'sensitizes' the material to other, more subtle, influences. Experiments were done projecting sound into a variety of gases and liquids, but perhaps the most revealing were his experiments with water.

A little over 15 years ago, I arranged to film an exhibition in Zurich where some of Dr Jenny's original equipment was reassembled to demonstrate a few of the experiments he had done some three decades earlier. We placed a small sample of water onto a lens with a containment ring around it to keep the water in place and then positioned a light beneath the lens, which projected through the water and reflected off a mirror and onto a screen. When we set the lens vibrating with an audible frequency the water began to reflect back and forth on the lens, forming an oscillating dynamic of hills and valleys – and *voilà!* the pattern of sound-induced, standing waves became visible as a luminous image (Figs. 6–8).

As the water is subjected to gradually increasing frequencies, the complexity of the patterns increases with the increasing pitch of the exciting tone. At a critical pitch the entire structure dissolves into chaos, only to re-configure into a higher order of complexity, as the tone continues to ascend. [Ed. note: A similar progression can be seen in the sequence of images from the book on our front cover (see page 16 for full explanation). Between each of these successive sound figures an interval of chaos transpires where no coherent forms are evident.]

This process of chaos and re-integration is seen throughout

nature, from the valence fields of electrons within the atom (the Periodic Table of Elements), to complex weather patterns, to intricate, physiological processes within our bodies that allow us to function in homeostasis within an ever-changing sea of vibrations (our environment). It also serves as a 'living metaphor' for the process of evolution occurring at all levels of creation, from the physical to the subtlest domains of consciousness – and its implications are equally vast.

Chaos: a necessary phase Acceptance: a personal choice

Jenny's work was truly ground-breaking; he was a forerunner of chaos theory and complexity science and his experimental method now provides a solid foundation for the therapeutic application of sound and music. It is interesting that, although Jenny was a medical doctor, he purposely steered clear of taking the leap into what we now call sound healing. I have no doubt that Dr Jenny was aware of these implications of his work. Rather he chose to focus on the empirical aspect of observable phenomena, so as to provide an indisputable body of objectively verifiable research that would establish a foundation for further experimentation.

For me, personally, viewing these phenomena objectively allowed for a deeper understanding of just how this process of 'disintegration and re-configuration at a higher order of coherence' constantly plays out in my own life. '*We live in a vast ocean of sound,*' in other words, we are perpetually bathed in a plethora of energetic currents, which invite, nay, compel us to flow along with them! Our choice lies in selecting which of these currents we will merge with and what forms we will animate through our vital forces of acceptance and will. Whatever our situation – be it a healing crisis or some other life challenge that we no longer can ignore – something is flowing into our awareness urging us to incorporate a greater point of view. The way we identify with our situation – the stories we tell ourselves about it and how we feel about ourselves – absolutely determines how we navigate our experience. We can either get caught up in the turmoil by accepting a reality that has yet to evolve to a more coherent state, or we can relax in the knowledge (perhaps faith, at this point) that a lovely, harmonic form is just waiting for us to enter into resonance with (embody) it.

Echoes of light and water...

As I was compiling Jenny's work for the new edition, I was unaware that there were two contemporary researchers who were carrying on similar experiments independently, one in the UK and the other in Germany.

Acoustic engineer and long-time UK Cymatic researcher, John Reid has developed an electro-acoustic device enabling one to visualize the voice, music and other sound sources.⁷ We will be working together to bring these instruments into the hands of researchers, musicians, therapists and especially children, to further evoke the awe and wonder that arises spontaneously as creation takes shape right before your eyes. One of these new CymaScopes was recently installed at *jexplora!*, a children's science museum in Albuquerque, New Mexico.

Within a few months of my re-publishing *Cymatics*, Alexander Lauterwasser's book, *Wasser Klang Bilder* (*Water Sound Images*) was published in Switzerland. His expertise as a photographer as well as his use of 21st century technology allowed him to capture precise and spectacular, standing wave patterns in water. (Is it fate or destiny that a man whose name translates as 'Loud Water' would be drawn to this kind of work?!) Lauterwasser has clearly elevated Cymatic phenomena into the realm of photographic artistry [see review, p. 40].

One of the many things he documented was the phenomenon of different wave patterns created by various musical instruments, two of which are shown on the following page.⁸

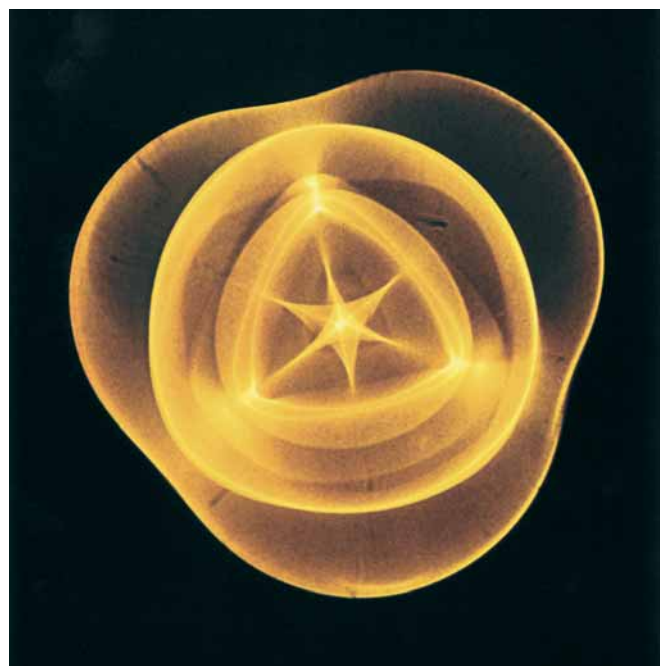
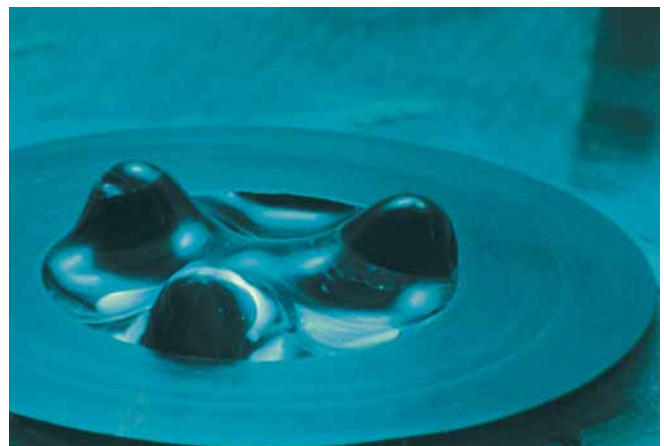
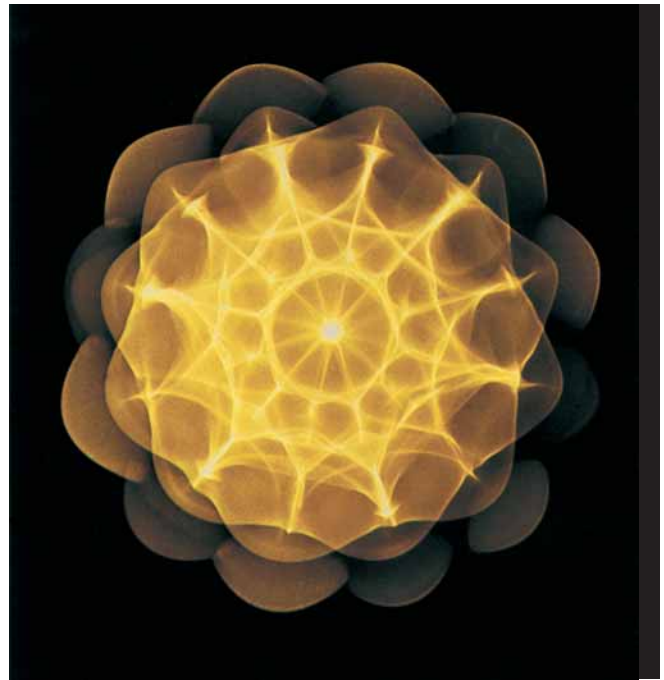
A small sample of water is contained within a petri dish and lit from above, highlighting the wave crests. The first image (Fig. 9) is a simple tone, almost a pure sine wave, generated by plucking a single string, a monochord. This sets up a very basic, resonance pattern in the water as it is excited by the (electronically amplified) pulsation of air generated by the oscillating motion of the string. The concentric ring pattern is the result of the water moving outward and striking the boundary of the dish, then reflecting back in upon itself and repeating this over and over as long as the tone is maintained. In the next image (Fig. 10) you can still distinguish the monochord's 'sound-print' amidst the greater complexity added by the overtones of the voice.

It is interesting to consider the effect that these multiple-frequency impulses would have on the tissues of the physical body, much less the highly responsive and dynamic 'tissues' of the psyche. British osteopath, Peter Guy Manners, compiled a large body of research over several decades to discern specific frequency commutations that would effectively treat various physical and emotional conditions.⁹

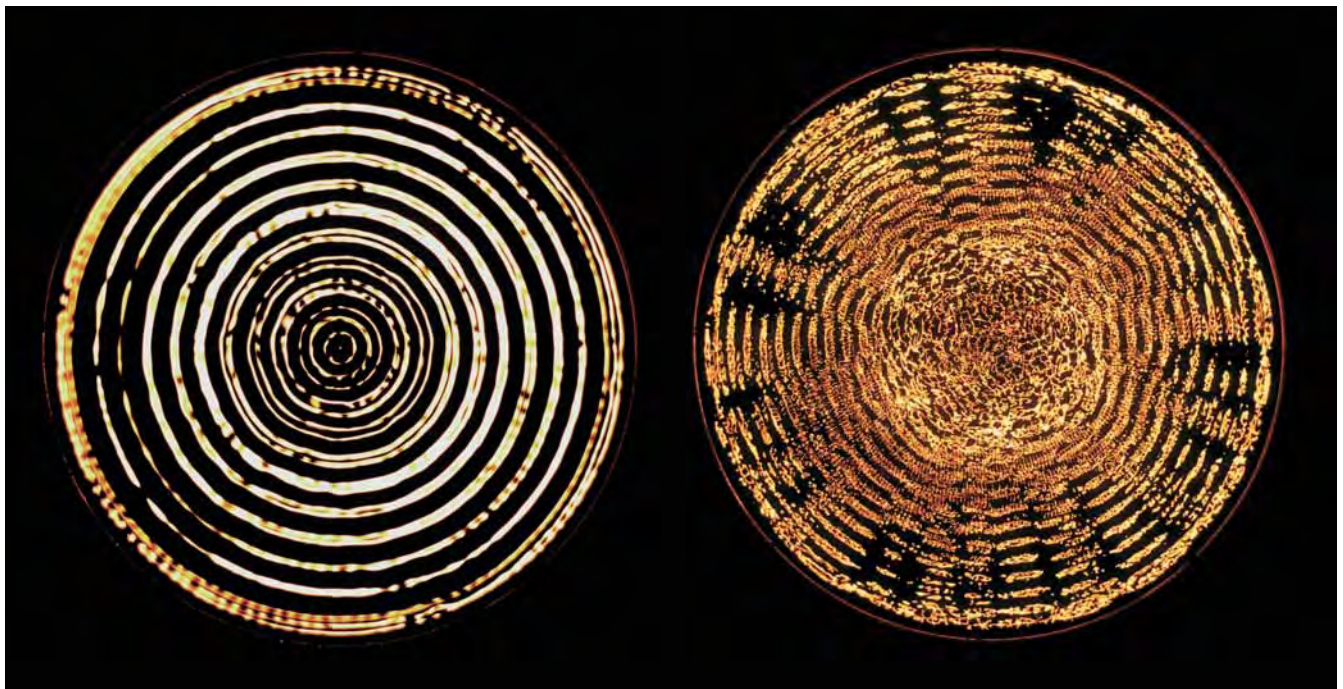
How Cymatherapy® works

All matter exists at specific densities or, looked at another way, at different rates of vibration. Therefore, each individual particle or collection of particles will have its own unique, resonant frequency. This is why you can make a wine glass or a crystal bowl sing so brilliantly when you excite them within the narrow range of their natural, resonant frequency. For several years medical scientists have been using this principle to break up kidney stones and, more recently, to excite the individual cancerous cells within a tumour to the extent that they rupture, thus destroying the tumour.¹⁰

Because every person's anatomy is different, the same organ or tissue in your body will have a slightly different resonant frequency from mine, but within a very narrow range. Manners solved this problem by using a tone consisting of an overlay of five frequencies, producing a harmonic of the tissue. Five seemed to be the 'magic number', creating a frequency signature precise enough to stimulate the targeted bone, organ



Top to bottom: **Fig. 6** Light refracting through a small sample of water (about 1.5 cm in diameter) under the influence of vibration. **Fig. 7** Strobe image of vibrating water viewed from above. **Fig. 8** The projected light image of the same phenomena. ©2001 MACROmedia Publishing.



Left: **Fig. 9** Water sound image of a monochord. Right: **Fig. 10** Monochord with overtone singing. Below: **Fig. 11** The newly designed CymaScope™ electroacoustic sound imaging device.

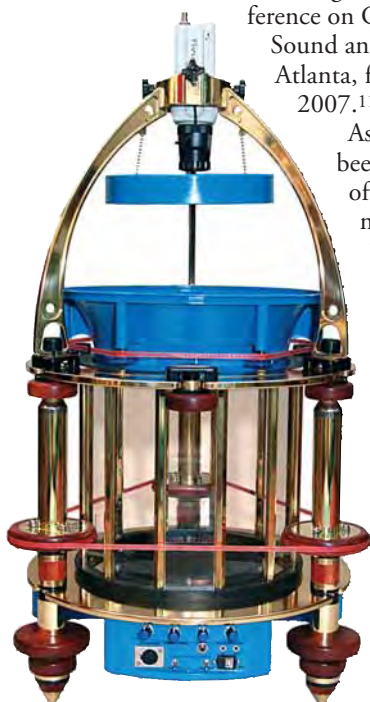
or muscle tissue, while at the same time enabling one generic setting to work effectively, despite individual variations.

Why five frequencies? Various theories have been put forth including that it relates to the Chinese theory of the five elements, which are themselves based on the esoteric principles of the five platonic solids. A more biological interpretation might be that these frequencies are somehow related to the five main stages of the cell renewal process. Suffice to say that this particular patterning of five audible, sound frequencies has been shown to effectively correspond with the given tissue throughout a broad population over several decades of clinical research and therapeutic application.

Atlanta-based Cymatherapy International is continuing Manners' research and development in the US, with its thoroughly revamped, therapeutic device, the Cyma 1000. It will be hosting the second international conference on Cymatics: The Science of Sound and Vibrational Healing, in Atlanta, from 11–14 September, 2007.¹¹

As stated at the outset, this has been a concentrated *tour de force* of some of the exciting developments in the field of Cymatics.

The implications of this research to the field of sound therapy are vast and there are many, yet unimagined applications that await our creative investigation. Even a rudimentary knowledge of the generative process of sound is immensely enlightening to anyone who makes music, especially for therapeutic purposes. I invite you to explore the references below, which can provide a much broader understanding. ✪



References

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 11. More information is available at <http://www.cymatherapy.com>.
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Cover Image: A sequence of 'standing wave' patterns in water subjected to gradually increasing audible sound frequencies from 10 Hz (lower left) to 160 Hz (upper right). From *Water Sound Images* by Alexander Lauterwasser. ©2006 MACROmedia Publishing.

Jeff Volk is a poet, producer and publisher. In 2001 he re-issued Hans Jenny's ground-breaking *Cymatics* books which scientifically demonstrate how audible sound creates harmonic, geometric patterns. He produced a series of videos on Cymatics and recently re-released Dr Jenny's original films on DVD. His video, *Of Sound Mind and Body: Music and Vibrational Healing*, won the Hartley Film Award and for the next six years he produced the *International Sound Colloquium*, a conference exploring the power of sacred sound and healing music. In 2006 he published the English language edition of *Water Sound Images* by Alexander Lauterwasser. He presents throughout North America and is helping to promote the new CymaScope® sound visualization instruments.