

Article

Schumann Resonance, Psychophysical Regulation & Psi (Part I)

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ABSTRACT

This article concurs with Lewis Hainsworth's pioneering research on the health correlates of Schumann Resonance ("SR") and postulates, along with Pitkanin and Sidorov, that SR may be the substrate for a radar-type extrasensory perception mechanism common to all organisms. SR forms a sort of global guidance system for life. Resonant absorption of an oscillating signal and reaction is presumed as most brainwaves fall within the first five SR modes (0-35 Hz). Frequency matching amplifies even weak signals, even in the presence of other strong static and oscillating fields. It is vital in brain-to-cell and cell-to-cell communication.

Part I of this two-part article contains: Introduction; Planetary Rhythms; Ducted Propagation; Physiological Frequencies, Coherent Resonance & Well-Being; EM Frequencies & Human Response; and Measuring Brain Waves by EEG.

Key Words: EMF, Schumann Resonance, psi, ionosphere, resonance, solar flares, ULF/ELF, diurnal cycles, endocrine hormones.

Introduction

The Schumann resonance (SR) is defined as a set of resonant modes or spectrum peaks, between 7.83 and 45 Hz, in the extremely low frequency (ELF) portion of the Earth's electromagnetic field spectrum. The fundamental Schumann Resonance is a standing wave in the atmosphere around 8 Hz. Human brainwaves are entrained to this pulse emitting theta and alpha frequencies in the same EMF region. The reciprocal system functions as a phase-locked loop.

A phase-locked loop or phase lock loop (PLL) is a control system that generates an output signal whose phase is related to the phase of an input "reference" signal. It is an electronic circuit consisting of a variable frequency oscillator and a phase detector. The signal from the phase detector is used to control the oscillator in a feedback loop. (Wikipedia)

Necessary for mammalian growth and repair, such signals in guidewaves in the geomagnetic cavity are the meta-drivers of biological processes, homeostasis and adaptation. We cannot thrive without them.

Cells respond between 3 - 25 Hz. Frequencies outside this range have little or no effect. Cell membranes oscillate, or resonate to create a "biological window". Each "window" has measurable and definable frequency, amplitude and a phase that has discrete ranges projected on

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different characteristics of the wave. Active "windows" facilitate information transfer and adaptive activities. Changing windows creates functional changes called a phase change that helps us adapt to environmental changes.

Outside the earth's magnetic field for extended periods, early cosmonauts lost 80% of their bone density. Michael Persinger developed Schumann wave generators (7.83 Hz) for space flights that overcame this side effect. Geomagnetic anomalies can amplify local SR in certain geological conditions potentially stimulating coherent resonance in alpha brainwave, forming a tuned system. Solar/geomagnetic interactions correlated with sunspots and solar flares significantly perturb SR.

Solar events release cosmic rays which enhance the ionization of the D-layer up to a factor of 10 with Sudden Ionospheric Disturbances (SID). Such ELF signals affect tissue electric gradients of ULF/ELF oscillating signals, involving non-linear resonant absorption of ULF/ELF oscillating signals into systems that use natural ion oscillation signals in the same frequency range. ULF/ELF signals can significantly alter cellular calcium ion fluxes and EEGs in brain tissue.

This article concurs with Hainsworth's pioneering research on the health correlates of SR, and postulates, along with Pitkanin and Sidorov, that SR may be the substrate for a radar-type extrasensory perception mechanism common to all organisms. SR forms a sort of global guidance system for life. Resonant absorption of an oscillating signal and reaction is presumed as most brainwaves fall within the first five SR modes (0-35 Hz). Frequency matching amplifies even weak signals, even in the presence of other strong static and oscillating fields. It is vital in brain-to-cell and cell-to-cell communication.

Planetary Rhythms

Geospace is the term that relates to the solar-terrestrial environment and the relevant space occupied by Earth and her fields. Schumann Resonance (SR), global electromagnetic resonances excited by tropical lightning, is one of the natural EM fields in our planetary environment. On average, there are about 200 scattered lightning strikes taking place each second. But resonances can be excited by any electromagnetic disturbance in the atmosphere, including geomagnetic micropulsations.

Solar or geomagnetic activity leads to changes of the dielectric permeability in the Schumann cavity. The fundamental SR mode roughly corresponds to a wave with a wavelength equal to the circumference of the Earth. It has existed since the Ionosphere formed and lightning began, pre-dating animal life. If a radio wave circles the globe, SR occurs when the phase delay of that wave equals 2π . SR is a global phenomenon, while transverse resonance is local. If the wave bounces between the ground and ionosphere, it is trapped between two 'mirrors', kindling transverse resonance.

Transverse resonance is predominantly a local phenomenon containing information on the local height and conductivity of the lower ionosphere and on nearby thunderstorm activity. Waves in

the ULF range ULF range (i.e., below the first Schumann Resonance), will have wavelengths much larger than the circumference of the Earth.

ULF waves, at approximately 1 mHz to 1 Hz, play a major role in propagating energy throughout the magnetospheric system. At the lowest end of this frequency band, the wavelength of ULF waves is comparable to the entire magnetosphere. In this frequency range, the global structure of the magnetosphere can lead to global cavity resonances and waveguide modes. The structure of these modes is determined by the gradients in the Alfvén and fast mode speeds in the magnetospheric system. (Lysak)

SR is *not* the internally-generated resonant frequency of our planet, which is 10 - 11.75 Hz as Tesla discovered. Earth itself emits a predominantly infrared wave from its hot core and re-radiated solar energy it absorbs. Schumann fields are weak compared to the earth's much larger static geomagnetic field. SR is electromagnetic oscillations -- the Earth's global electric circuit consisting of the frequencies that play through the ionospheric cavity (space between the ground and ionosphere) as waves in a plasma. It rings like a tuning-fork. The ionosphere is a highly-conductive region of cosmic plasma, a sea of free electrons – ions.

Earth's cavity responds to solar fluctuations like a tuning fork, tuned to 7.83 Hz. The solar-terrestrial environment is modulated by solar cycles which affect the global climate and all organisms in the biosphere. Interference patterns are the transducers of energy, which at its most fundamental is described as information. Earth functions like a planet-sized electrical capacitor or condenser, storing electrical potential.

Ducted Propagation

The space between Earth and the ionosphere is a dissipative closed cavity between 50-375 miles that can sustain quasi-standing waves at wave lengths of planetary dimension. Electrical conductivity in the atmosphere is driven largely by cosmic rays that generate a torsion field. Conductivity increases exponentially with altitude because the lower atmosphere buffers collision frequency.

The ionosphere begins about 50 miles out from the Earth's surface and extends out over 180 miles. It consists of charged particles. This highly dynamic region is constantly exposed to harsh ultraviolet radiation from the Sun. It breaks down molecules and atoms. Highly charged ions and free electrons therefore fill the ionospheric layers creating a "spectral power station".

Through ducted propagation, lightning radiates broadband EM fields that spread laterally into the cavity. Global thunderstorms excite the Schumann resonances, which can be observed around 7.8, 14, 20, 26, 33, 39 and 45 Hz. Changes occurring in these frequencies are quite normal and do not indicate anything out of the ordinary. All of these frequencies fluctuate around their nominal values. The resonant spectrum is a superposition of global lightning discharge. For these resonant values to change, the planet would have to change diameter.

The Schumann resonance modes, like other low-frequency modes, are able to leak into the ionosphere, particularly at night when the plasma density is lower:

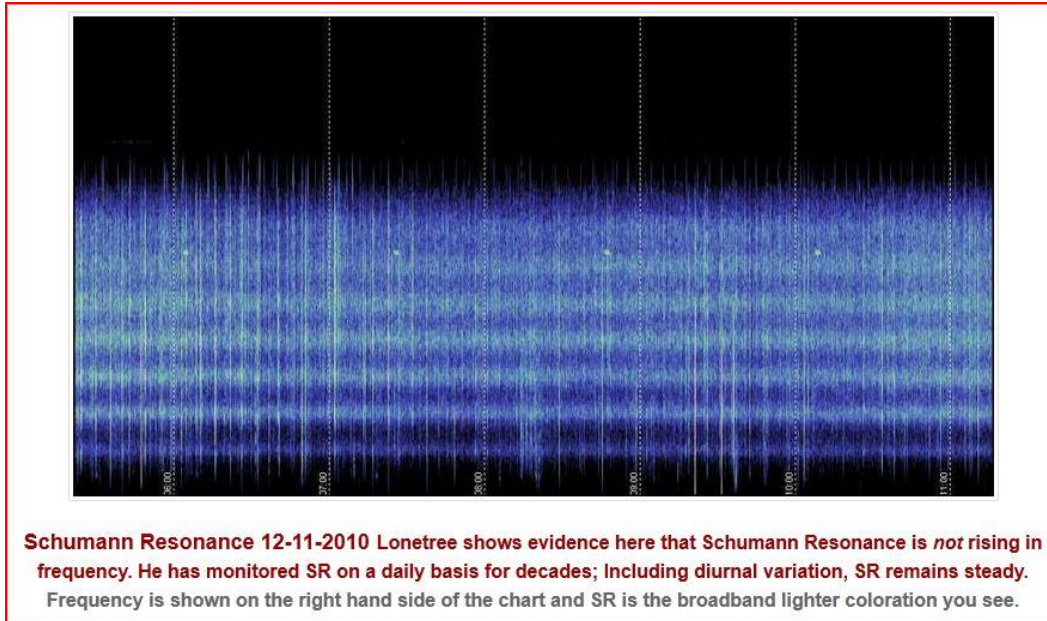
Using measurements from the Communications/Navigation Outage Forecasting System (C/NOFS) satellite, we report, for the first time, Schumann resonance signatures detected well beyond the upper boundary of the cavity. These results offer new means for investigating atmospheric electricity, tropospheric-ionospheric coupling mechanisms related to lightning activity, and wave propagation in the ionosphere. The detection of Schumann resonances in the ionosphere calls for revisions to the existing models of extremely low frequency wave propagation in the surface-ionosphere cavity. (Simoes)

Frequencies describe periodic cycles per second, measured in hertz (Hz). Such frequencies have wrapped earth's biosphere since its inception. Normal daily variation ranges ± 0.5 Hertz. Another normal source of fluctuation is Coronal Mass Ejections from the sun that leads to proton bombardment. Bursts may increase of the Schumann frequency by 3.5%. These effects are explained by changes of the height and dielectric permeability of the Earth-ionosphere cavity.

In the early to mid-1950s, geophysicist Schumann suggested that electromagnetic signals might circulate at extremely low frequencies in the electrically resonant cavity between the Earth and the ionosphere. He was right. The signals came to be called "Schumann's resonances". One major component was originally predicted at a frequency of about 10 Hz. In 1959 it was measured to be slightly different. Meanwhile, the military co-opted the discovery for using ELF signals in submarine communications.

The first mode of these circulating signals has an average value of 7.8 Hz, with a typical diurnal range of from 7.2 to 8.8 Hz, and the second mode has an average value of 14.1 Hz and a range of from 13.2 to 15.8 Hz. These match the brain-wave theta rhythm and beta rhythm nicely. The blank range between the two modes is a very reasonable match with the normal frequency range of the human alpha rhythm, between 8 to 12 Hz or cycles.

Additionally, it was found that there is minimum (zero) power circulating in the Earth/ionosphere cavity at 10.4 Hz--which is virtually an exact match for the average value of the alpha rhythm. The existence of these natural signals and the close relationship of their frequencies of oscillation to key human rhythms were unknown to senior neurologists and mental health specialists as late as 1975. But recent years have seen escalating interest in geophysics in both the public and academic sectors, including its effects on our psychobiology.



A persistent New Age meme was begun by a self-styled "expert" without any accurate citations to promote his commercial idiosyncratic notions. It is entirely fallacious though it has become widespread on the Internet: "The resonance of Earth (Schumann Resonance) has been 7.8Hz for thousands of years. Since 1980 it has risen to over 12Hz. This means that 16 hours now equate to a 24 hour day. Time is speeding up! Recent reports set the rate at over 11 cycles, and climbing. Science doesn't know why, or what to make of it." It is demonstrably untrue as Lonetree's continual monitoring has shown. It isn't true and it was never true, and it isn't becoming true even at the peak of the current solar cycle. Furthermore, for it to happen would require the Earth shrinking or the speed of light changing dramatically. (Lonetree & Miller)

Physiological Frequencies, Coherent Resonance & Well-Being

We are bathed in a sea of natural low-frequency electromagnetic (EM) fields from conception to death. The brain is an electromagnetic system synchronized by the Schumann Resonance signal, that that continuously stabilizes the brain wave activity.

The frequencies of EEG brainwaves coincide with the range of SR activity. Blackman (1990) established that external electromagnetic ELF signals induce altered neuron calcium ion effluxes in brain tissue. Stable synchronizing of the brain's electromagnetic systems underpins thinking, emotion, memory and intelligence. Significantly, the hippocampal wave, which exerts a decisive influence on brain function and long term memory, shares the same frequency as the primary SR – 7.8Hz.

SR modulates the set points of our consciousness and biology. Living tissues detect, absorb and utilized electromagnetic signals within some frequency ranges and completely ignore other frequencies naturally encountered in the frequency spectrum. We are "in tune" with Schumann Resonances which drive brain wave ELF patterns in a set range of grouped frequencies. Some describe "antenna" like qualities in the brainwave 8-12 cycle range.

We have electromagnetic transmitters and receivers in our neurons, including a phase-locked loop system. Our brains detect and respond to the SR signal through nonlinear resonant matching of frequency, altering optimal melatonin/serotonin cycle balance, cardiac, neurological, reproductive health and mortality. Solar storms modulate daily variation of the D-Region reflected in daily variation in the Schumann Resonance signal strength.

This primal lightning-driven Schumann Resonance pulse calibrates us and enhances our physical and mental well-being. We are all tuned to that wave, which correlates with a relaxed and creative mind. That natural resonance helps us achieve our optimal brainwave states, but this atmosphere-to-human linkage is disrupted by the electrosmog of today's ultra-technology.

Cherry (2002) found that the Schumann Resonance signal is extremely highly correlated with Solar Geomagnetic Activity (S-GMA) indices of sunspot number and the Kp index. The physical mechanism is the ionospheric D-region ion/electron density that varies with S-GMA and forms the upper boundary of the resonant cavity in which the Schumann Resonance signal is formed. His evidence supports the notion that SR signals are the S-GMA biophysical mechanism, primarily through a melatonin mechanism. He therefore identifies S-GMA as a natural hazard with biological and health effects.

Away from artificial noise and thunderstorms SR is the main component of the natural EM background between 6 and 50 Hz. The fundamental Schumann frequency fluctuates between 7.0 Hz. to 8.5 Hz. Such frequencies vary from geological location to location. They can even have naturally occurring interruptions.

Schumann's successor, Dr. Herbert König demonstrated a connection between Schumann Resonance and brain rhythms. König compared human EEG recordings with natural electromagnetic fields in the environment, finding that 7.83 Hz is the dominant brain wave rhythm of all mammals in alpha or resting state. When the brain resonates with SR energy information is transmitted that appears to coordinate psychophysical systems.

Lewis B. Hainsworth, (deceased) of Western Australia was among the first researchers to recognize the relationship of brain-wave frequencies to the naturally circulating rhythmic signals of SR. Hainsworth shared this data with Dr. Robert O. Becker, noted electromagnetic pollution expert, and to Harvard neurologists as early as 1975. Becker included it in his three classic books on electromagnetism and life (1982, 1985, 1990).

Robert C. Beck, another EMF researcher, found that the human body has numerous very specific frequencies that trigger production of different endorphins, beta-endorphins, catecholamines, enkephalins, dynorphins, proteins, and stem cells. He found about 250 different key frequencies that trigger the body to produce its own healing chemicals. Beck studied about 150 different brain wave stimulation devices, and their effects experimentally.

Bentov found that several other interlocking resonating systems in the body were activated by this steady 7 to 8 Hz activity during meditation. The upper part of the body has a resonant frequency of about 7 Hz under normal conditions. Bentov noted that additional resonance effects are likely, resulting from this "phase interlock phenomenon".

Other systems besides brainwaves are affected by the Schumann resonance. As quoted in Smith, Ludwig (1987) has measured and compared a large number of the ELF rhythms in human subjects with resonant frequencies in homeopathic remedies using a spectrum analyzer. Bentov reported that Schumann calculated the earth-ionosphere cavity resonance frequencies at 10.6, 18.3, and 25.9 Hz, and he reported more recent values calculated by Toomey and Polk at 7.8, 14.1, 20.3, 26.4, and 32.5 Hz. Ludwig found a number of frequencies have been found to be common to all the subjects and to relate to the specific physiological functions. For example, the frequency 0.1 Hz relates to the circulatory system, 7.8 Hz relates to the hippocampus, 10 Hz to the circadian rhythms, 33 Hz to the lymphatic system, etc. (Roffey)

Oschmann links healing energies to these rhythms of Earth's atmosphere. "*Robert C. Beck has used EEG recordings to study brain wave activity in 'healers' from all over the world: psychics, shamans, faith healers, a Hawaiian kahuna, practitioners of wicca, etc. All these healers produced similar brain wave patterns when they were ... performing a healing... all healers registered brain wave activity averaging about 7.8-8.0 cycles/second... Beck performed additional studies on some of the subjects and found that during healing moments their brain waves became phase and frequency synchronized with the earth's geoelectric micropulsations – the Schumann resonance.*" (Oschman)

Research has shown that the Schumann resonances can modulate human health indicators such as blood pressure, cardiac and neurological disease, reaction time, neuroendocrine sensitivities, violence and war. It also correlates with sunspot activity, mass human excitability, sociality, and climate change (Tchijevsky).

Suitbert Ertel (1997) in "Bursts of creativity correlate with solar activity" examined the association between solar activity and oscillations in human creativity. His results showed that during increased solar activity, human creative activity also peaks. Tchijevsky agreed that the influence on human nervous systems is greatest during peaks of emitted energy by the sun and radiation of the earth. Chemical bonds are magnetic bonds, formed between adjacent atoms through paired electrons having opposite spins and thus attracted magnetically.

In 1977, this phenomenon -- the relationship between brain-wave rhythms and the spectrum of the natural Earth ELF (extremely low frequency) signals--became the basis for Itzhak Bentov's popular book *Stalking the Wild Pendulum*. He also suggested geophysical correlates affect people's health, emotional balance and spiritual well-being.

Ancient cultures such as Egyptian, Hopi, Ancient Indian, Mayan, Aztec and Chinese, correctly assumed that their collective behavior was influenced by the sun. Contemporary research confirms a relationship to human health and well-being. Even ESP or psi phenomena is predicated on the assumption that all living things are interconnected and communicate with each other via biological and electromagnetic fields.

Hainsworth sent up a clarion cry against hazardous EM (electromagnetic) pollution, whose continuous dangers pale in comparison to the threat of technologies such as HAARP [High-frequency Active Auroral Research Program], which sends violent pulsations into the Earth's ionosphere, potentially disrupting the entire electromagnetic shield of the planet and certainly affecting the whole biosphere and thus human welfare in general.

Some research (Braden) has suggested that the frequency of the basic Schumann's resonance has recently been rising in value, possibly threatening the whole biosphere, human welfare and our evolutionary future. But this is totally unsubstantiated fallacious disinformation. There is *no* evidence whatsoever of rising SR. The author's colleague Ben Lonetree has been monitoring SR daily for nearly two decades without any anomalous readings, proving the persistent New Age meme is undeniably incorrect.

All biological processes are a function of electromagnetic field interactions. EM fields are the connecting link between the world of form and resonant patterns. They store gestalts or patterns of information. The bridge connecting solar system resonances and brain frequencies resides in our human DNA helix, which co-evolved in the Earth's environment.

Electrical engineer Lewis B. Hainsworth, MA, was among the first to suggest that human health is linked with geophysical parameters by way of the naturally occurring Schumann's ELF. His hypothesis identified naturally occurring features which determine the frequency spectrum of human brain-wave rhythms: The frequencies of naturally occurring electromagnetic signals, circulating in the electrically resonant cavity bounded by the Earth and the ionosphere, have governed or determined the 'evolution' or development of the frequencies of operation of the principal human brain-wave signals. In particular, the alpha rhythm is so placed that it can in no circumstances suffer an extensive interference from naturally occurring signals.

Hainsworth concluded that the frequencies of human brain-waves evolved in response to these signals. If his hypothesis is correct, conditions for evolutionary changes in human brain-wave patterns have now been established. Furthermore, variations in these patterns can produce mild to disastrous health and behavioral changes.

The nature of the applied stimulus makes it difficult to identify the responses directly, as they are most likely to occur in the form of stress-related conditions. They will therefore show up as drastic increases in mental disturbance, antisocial behavior, psychosomatic conditions and neurological disturbances. Some electrical field phenomena have already been linked with abnormal cell growth and a decrease in immunocompetency.

All these factors could be expected to lead to the appearance of "new" diseases, probably accompanied by a decline in resistance to many minor infections, an increase in conditions related to abnormal cell development, including cancer, birth defects and infertility, and an increase in psychological disturbance problems, e.g., drug addiction and suicide. These existing psychobiological problems could be expected to increase in scale, but could be studied for deviations from "normal" alpha cycles of 10.4 Hz, with detectable changes in psychological characteristics and mental abilities.

Hainsworth therefore strongly urged that research into widespread measurements of the natural SR signals' frequency variations and field strengths be carried out and compared with statistics for the incidence of heart attacks, suicide attempts, road accidents, social violence, domestic accidents, crimes, etc. Studies are often conducted in this inferential way (i.e., Krippner and Persinger), searching correlations between the phenomena of Earth lights and tectonic strain and reports of UFO sightings, abduction reports and other anomalous psychophysical experiences for an electromagnetic connection to temporal lobe seizures.

We strongly suggest that correlations of broad changes in the modulations of SR be studied in relationship to microwave radiation, ELF signals and HAARP for both immediate and long-term consequences. There are many obvious ramifications of such EM pollution and 10-50 Hz modulations on the human system (Miller, 2001).

We have also discussed the benefits for human well-being and relaxation from entraining with these natural rhythms (Miller & Miller, 1981). When a person is deeply relaxed, slow rhythmic sine-wave patterns can be detected in both the EEG and the heart/aorta resonating oscillator in the 7-8 Hz range. Resonance occurs when the natural vibration frequency of a body is greatly amplified by vibrations at the same frequency from another body.

Oscillators alter the environment in a periodic manner. Thus, standing waves in the body, whether during meditation/relaxation or not, can be driven by a larger signal. Progressively amplified wave-forms, created by resonance, result in large oscillations entraining other circuits in the body tuned to those frequencies. A hierarchy of frequencies thus couples our psychophysical selves to the harmonic frequency of the electrical charge of the Earth, which naturally pulses at the same frequencies. This is hardly a coincidence, as we are adaptive products of our environment.

Our planet is surrounded by a layer of electrically charged particles called the ionosphere. The lower layer of the ionosphere is roughly 60-80 kilometers (40-50 miles) from the crust, and this charged layer is known to reflect radio waves. Bombardment by HAARP signals "pushes" out this boundary layer, thus altering the natural, pulsating rhythm. Natural fluctuations in frequency occur daily, by the lunar month, and in response to solar flares.

Since the ionosphere is a highly charged layer, it forms a so-called capacitor with the Earth. This means that there is a difference in electrical potential between the two, the Earth being negatively charged and the ionosphere being positively charged. This potential varies somewhat, but is around 200 volts per metre. This is a fundamental type of electrical generator. The solar winds, interacting with the upper atmosphere rotation, act as the collector and brushes of a generator. The lower atmosphere can be seen as a storage battery for this gradient potential.

This electromagnetic field around the Earth can be viewed as a stiff jelly. When our bodies move and vibrate, these movements are transmitted to the environment, and vice versa. These fields not only impinge on our bodies, they also affect the charges inside our bodies. When we are standing on the ground, under normal conditions, we are grounded. Our body then acts as a sink for the electrostatic field and actually distorts the force-lines somewhat. The human body also has its own electrostatic field about itself.

These field lines are the result of the various biochemical reactions in the body. This resultant bio-field couples us to the iso-electric field of the planet (Miller & Miller, 1981).

In 1957, German physicist Dr W. O. Schumann calculated the Earth/ionosphere cavity resonance frequencies (which were named after him). He fixed the most predominant standing wave at about 7.83 Hz.

A "tuned system" consists of at least two oscillators of identical resonant frequencies. If one oscillator starts emitting, the other will be activated by the signal very shortly, in the process of resonance, entrainment or kindling (igniting the resonance phenomenon among the neurons). It becomes obvious that in deep meditation, when waves of alpha and theta rhythms cascade across the entire brain, a resonance is possible between the human being and the planet. Energy and information which are embedded in a field are transferred. Perhaps the planet communicates with us in this primal language of frequencies.

According to Hainsworth, the influence of naturally occurring Schumann's resonance signals on brain-wave pattern evolution is formally stated to show that low-power electrical fields could produce evolutionary change. The electrical fields produced by modern electro-technology are then possible sources of evolutionary change. The characteristics of some forms which might result should be considered. Some fields might inhibit survival of existing forms. Because of lack of available data, precise measurements are lacking and must therefore be quantitatively valueless. Technology not only will change, but is changing, human evolution. Only extensive investigation of the naturally occurring signals will give any lead in showing what results might occur.

The possibility exists that human health is linked with geophysical parameters by way of the naturally occurring Schumann's resonances. A number of attempts have been made to discover the correlation through geomagnetic and ionospheric storms. The correlation comes through the biological fact that the human system is apparently sensitive to such low-power ELF signals. We don't know what the range of such a correlation might be.

The frequency values of the SR signals are determined by the effective dimensions of the cavity between the Earth and ionosphere. Thus, any events which change these dimensions will change the resonant frequencies. As Hainsworth warned, "such events could be ionospheric storms, and could even result from a man-made ionospheric disturbance".

Geomagnetic storms are the magnetic changes produced by ionospheric storms, and are thus associated with conditions capable of modulating the SR signals. However, although such storms can produce these changes, measurement of these parameters cannot give any indication of whether the resonance signals have changed to a value outside their normal range or not. Since the undisturbed state of the ionosphere corresponds to the normal SR patterns, then ionospheric disturbances are likely to produce abnormal patterns, but will not necessarily do so in all cases. If biological response is linked to Schumann's resonance signals, this will reduce any apparent link with geomagnetic or ionospheric data.

Trying to determine the relationships between geophysical and biological conditions can become extremely complex. The frequencies of the SR signals change with ionospheric conditions. These conditions change diurnally, seasonally and with variations in solar activity, which, in turn, varies with the 11-year sunspot cycle and also with the 27-29-day lunar cycle, mainly during sunspot minimum periods. Lunar tidal changes in the height and thickness of the layers could also sometimes affect the cavity dimensions and hence the Schumann's frequencies. So can powerful ELF signals from HAARP and other atmospheric heaters.

It should be borne in mind that if some signal conditions are harmful, then other conditions might be beneficial. This means that if, for example, seasonal and tidal conditions have resulted in the signals being in a biologically disturbing state, then the advent of a solar flare could result in changes in the signals, bringing them into a biologically beneficial state. The converse could also occur.

If we are sensitive to ELF signals, then when these factors are considered we would expect to get confusion if we try to link any effect with geophysical changes. For instance, there could be incidences of classic states of "lunacy" in some years if damaging signals coincided with full moons, then in other years the observations and analyses would show that the effects were not lunar.

An analysis of the correlation between the incidence of ionospheric disturbance and rate of admission to Heathcote Hospital (Perth, Western Australia) for about a three-year total indicated that when a disturbance occurred then the admission rate changed. The probability of the association being random was of the order of 2000:1 against. However, the fact that sometimes the rate went up and sometimes down showed that ionospheric storms changed the rate of incidence of mental disturbance in a way that is consistent with that change being dependent on the actual causes being linked to variations in the Schumann's resonance signals. At that point, Hainsworth decided to concentrate on trying to get some observational work going on measuring the SR signals.

Hainsworth's set-up used a 2,000-turn, 1-metre-square antenna, and another of 1/3-metre square, plus amplifiers to handle signals from 0 to 30 Hz. His amplified Schumann's signals were analyzed in a laboratory. On one occasion the signal dropped to zero amplitude when a solar flare occurred, and did not start recovering for about an hour and a half afterwards. It was originally just under 7 Hz and came back at only just over 6 Hz. His next step would have been to develop a wave analyzer to try to pick out individual signals. But the failing health of both himself and his wife prevented this.

EM Frequencies & Human Response

Hainsworth posed a series of questions, all of which are answered with a resounding "yes". This should lead us in the direction of extreme caution towards introducing new EM or ELF sources and ionospheric changes in our environment. He presented his data in two papers (referenced at the end of this article and posted on the website <http://www.nwbotanicals.org>). His questions are as follows:

1. Does the human biological system contain, use or generate any forms of electrical signal?
2. Does it respond to any of these signals?
3. Does it respond to audible signals at these frequencies?
4. Does it respond to optical signals at these frequencies?

5. Do human signals change with psychological or mental states, such as stress or problem solving?

6. Does the human system respond to any very, very low-power electromagnetic signals?

Brain waves have only been studied since about the mid-1920s, and the signal form that is apparently most widely known and identified is the alpha rhythm. The frequency of this signal varies from individual to individual, but it lies between about 7-8 Hz and 12 Hz, with an average value of 10.5 Hz. Theta and beta rhythm signals also occur, and are identifiable by EEG below the 8 Hz and above the 12 Hz frequencies. Since the discovery and measurement of these signals, a great deal of effort has been devoted to trying to work out how they originated in the first place and what determines their frequencies of operation.

Hainsworth argued that up to the end of 1979, no long-term systematic measurements of any great value were being made of the Schumann's resonance signals. Measurements were being made only intermittently for the purpose of obtaining research data for use by post-graduate geophysicists in constructing esoteric mathematical models of the ionosphere. It follows from this that, until long after the end of 1979, no figures on these signals were available. Consequently, no "expert" can produce numerical evidence to support an objection to Hainsworth's original hypothesis, since the only numerical values available are those favoring it.

However, Hainsworth left us with some open-ended questions:

7. Has any evidence ever been obtained to indicate that the human system is totally unaffected by externally applied electromagnetic fields?

8. Have any measurement programs ever been attempted to show whether the human system is (a) totally unaffected, (b) always affected, or (c) sometimes affected by naturally [or artificially] occurring electromagnetic signals?

9. Has the existence of such signals, having a close relationship with human biological signal frequencies, been known for many years?

10. Have those relationships been studied with adequate protocols in any detail?

Schumann's resonances are actually observed, by experiment, occurring at several harmonic frequencies between 6 and 50 cycles per second (one cycle equals one hertz). Specifically they are found at 7.8, 14, 20, 26, 33, 39 and 45 Hz, with a daily variation of around ± 0.5 Hz.

Only as long as the properties of Earth's electromagnetic cavity remain about the same do these frequencies remain the same. Cycles may vary somewhat due to ionospheric response to solar cycle activity and properties of the atmosphere and magnetosphere. Projects, such as HAARP and its international clones, which heat up or blast out the ionosphere pose a potential threat to this interactive system.

Measuring Brain Waves by EEG

The resonant cavity formed between the ionosphere and the Earth produces rhythmic waves capable of entraining and phase-locking with brain waves.

Hainsworth seems to have been unfamiliar with extensive work in brain-wave research in neurology, hypnotherapy, biofeedback and neural feedback. This research includes extensive experiments in frequency-following response (FFR) and relating brain waves and brain-wave deficiencies to psychobiological states.

The brain is a massive source of ELF signals that get transmitted throughout the body through the nervous system, which is sensitive to magnetic fields. Brain waves and natural biorhythms can be entrained by strong external ELF signals, such as stationary waves at Schumann's resonances. Entrainment, synchronization and amplification promote coherent large-scale activity rather than typical flurries of transient brain waves. Thus, resonant standing waves emerge from the brain, which under the right conditions facilitates internal and external bio-information transfer via ELF electromagnetic waves. These SR waves exhibit non-local character and nearly instant communication capability.

The EEG (electroencephalograph) measures brain waves of different frequencies within the brain. Rhythmicity in the EEG is a key variable in the coordination of cortical activity. Electrodes are placed on specific sites on the scalp to detect and record the electrical impulses within the brain. Frequency Amplitude represents the power of electrical impulses generated by the brain. Volume or intensity of brain-wave activity is measured in microvolts. is the number of times a wave repeats itself within a second. It can be compared to the frequencies on a radio.

Raw EEG frequency bands include gamma (25-60 Hz); beta (12-25 Hz); alpha (7-12 Hz); theta (4-7 Hz); and delta (less than 4 Hz). Their ranges overlap one another along the frequency spectrum by 0.5 Hz or more. These frequencies are linked to behaviors, subjective feeling states, physiological correlates, etc. Clinical improvement with EEG biofeedback is traceable to improved neuroregulation in basic functions by appeal to their underlying rhythmic mechanisms.

Schumann's resonance forms a natural feedback loop with the human mind/body. The human brain and body developed in the biosphere, the EM environment conditioned by this cyclic pulse. Conversely, this pulse acts as a "driver" of our brains and can also potentially carry information. Functional processes may be altered and new patterns of behavior facilitated through the brain's web of inhibitory and excitatory feedback networks. Functional processes may be altered and new patterns of behavior facilitated through the brain's web of inhibitory and excitatory feedback networks.

The brain has its own set of vibrations it uses to communicate with itself and the rest of the body. EEG equipment distinguishes these waves by measuring the speed with which neurons fire in cycles per second. At their boundaries these waves can overlap somewhat, merging seamlessly into one another--so different researchers may give slightly different readings for the range of cycles per second (Hz). The rate of cycling determines the type of activity, kindling wave after wave over the whole surface of the brain by igniting more neurons.

(Continued on Part II which also contains the references)