

## INTRODUCTION

Consciousness, the very essence of our existence is the quality or state of being aware of an external object or something within oneself. (Webster and Gulick, 2004). Velmans and Schneider explored the concept of consciousness, "Anything that we are aware of at a given moment forms part of our consciousness, making conscious experience at once the most familiar and most mysterious aspect of our lives". Conscious experiences do define our lives, but the subjective, private, and qualitative nature of these experiences seems to resist scientific inquiry. Over the last two decades much has changed in consciousness science (Baars et al., 2003; Metzinger, 2003; Banks, 2009; Bayne et al., 2009). Alongside philosophical discourse a new science of consciousness has taken shape which integrates experimental and theoretical work across many fields including neuroscience, psychology, cognitive science, artificial intelligence, computer science, neurology, and psychiatry. (Seth, 2010)

At the heart, the very nature of the 'consciousness science' is judicious, warrant experimentation, observations and measurements. This perception invokes that it can be measured but the mystery remains alive. How we can measure consciousness? Some of the scientists deciphered some of the hidden secrets of consciousness; however, they are incapable to enlighten the whole phenomenology. Are conventional measurements approaches enough to discover the answers? Or should we start to see this problem from different perspectives? We firmly believe that direct measures of consciousness may influence the conscious state of the subject. As hypothesized in study by Movaffaghi and Farsi (2009) that the action of exogenous electromagnetic fields on biologic systems is mediated by endogenous energy fields resonating with and modulated by external fields. Experimental data also supports this theory (Nucetelli 1992; Oschman, 2000; Hintz et al 2003). Therefore we suggest a non-invasive approach to search indirect measurement of consciousness and also look for external correlate of consciousness present in the subjects under experimentation in a radiation free environment.

Recently workers (Satsangi, 2013; He, 2012; Nelson, 2011) have provided theoretical, experimental and empirical methods to measure consciousness, (spiritual, community and universal consciousness). However, the difficulty of measurement is still alive. The quest for methods of measurement is still on as Theologists, Neurologists, Cognitive scientists, Biologists and Psychologists and many more are coming forward with their different set of hypothesis and experiments to solve this problem.

In physics, the term “energy” refers to “the capacity to do work and overcome resistance”. Matter and energy are fundamentally interrelated, however, fields of force vary according to energy expressed, and information carried. The term “field” refers to “a force which can cause action at a distance”. Though field effects may be weak in terms of power, they may have a measurable effect on matter (Center for frontier medicine in biofield science). As a basic law in physics, when an electric current flows through a conductor, a magnetic field is created in the surrounding space. Ampere’s law quantifies the relationship between an electric current and the magnetic field produced at a distance from the current flow. (Movaffaghi and Farsi, 2009)

We would here like to suggest that the concept of biofield as an external correlate of consciousness in living organisms, such as man, animals and microbes. The biofield is defined here as the endogenous, complex dynamic electromagnetic (EM) field resulting from the superposition of component EM fields of the organism that is proposed to be involved in self-organization and bioregulation of the organism. The components of the biofield are the EM fields contributed by each individual oscillator or electrically charged, moving particle or ensemble of particles of the organism (ion, molecule, cell, tissue, etc.), according to principles of conventional physics. The resulting biofield may be conceived of as a very complex dynamic standing wave (Rubik, 1997; Zhang, 1995; 1996). It has a broad spectral bandwidth, being composed of many different EM frequencies, analogous to a musical symphony with many harmonics that change over time. (Rubik, 2002)

A small number of scientists have reintroduced the concept of a biologic field central to life. Tiller proposed the existence of a new force to explain certain features of life, in addition to the other four known forces of physics (Tiller, 1993). Popp and colleagues proposed coherent states in organisms and the emission of coherent electromagnetic waves (Popp, 1996). Savva considered the biofield to go beyond electromagnetism, involving a nonphysical mental component that carries the information of intention and the psychic realm (Savva, 1997, 1998). Zhang called the biologic field the “electromagnetic body” and considered it to be a complex, ultraweak field of chaotic standing waves, a dissipative structure of electromagnetic fields that forms the energetic anatomic structures including the *chakras* and acupuncture meridians (Zhang 1995, 1996). Welch proposed metabolic field structures of space–time (Welch, 1992; Welch and Smith, 1990). Rubik introduced the biofield hypothesis: its biophysical basis and role in medicine. (Rubik, 2002). The biologic field is seen as a holistic or global organizing field of the

organism by all these authors. Similar to the way a holographic plate distributes information throughout the hologram, the biologic field conveys information throughout the organism and is central to its holistic integration. The human biologic field is an organizing field within and emanating from the body, which hypothetically regulates the biochemistry and physiology of the body. The proposed biologic field is also a conceivable solution to the problem of how the information in an organism is stored beyond the genome. (Rubik, 2002)

We attempt to measure certain aspects of the biofield in man, animals and microbes and observe its footprints via novel technologies and link biofield and consciousness, as its external correlate. There is no doubt that this attempt is extremely sensitive to be done, but it may provide better options for the solution of consciousness measurement problem. The assembly of molecules, as in cells, tissues or organs will also produce certain collective frequencies (Rein, 2004).

This investigation is very much intended to find out the possible road map for the evolution of consciousness in Animal kingdom and its probable scaling from microbes to man. Thus, study of animal consciousness is an integral part of the set objectives. Cognitive scientists and biologists who study animal behavior reported the conscious behavior of animals such as chimpanzees, monkeys, crows, parrot, rats, portia (jumping spider), honey bees and octopuses (Griffin and Speck, 2004) etc.

Living structures and functions are orderly, and their biological oscillations are organized in meaningful ways. They contribute information to a dynamic vibratory network that extends throughout the body and into the space around it. (Rubik, 1995). In case of vertebrates, cattle like *Bos indicus*, and *Bubalus bubalis* it is known that they are conscious by virtue of their sacrificing behavior. Their body emits low-frequency light, heat, and acoustical energy; has electrical and magnetic properties. All of these emissions are part of their energy field or biologic field, or biofield. Hence, a study of their biofield may reveal some of the prime character of their conscious behavior. (Rubik, 1995) Significant work on consciousness study of such conscious animals is in scarce and so is for insects like mosquitoes. Mosquitoes are one of most significant Dipteran; have been selected for the consciousness studies, as there seems to be no significant research as such published on the consciousness measurement of mosquitoes. This organism is notorious due to outspreading fatal diseases globally and is responsible for millions of deaths of humans, but very smartly, genetically and physiologically it continuously bluffed our each effort to control them. They evolved constantly with humans sharing the same environment and we can

firmly then rely that mosquitoes do possess different senses and a level of consciousness, which reflects in their behavior within their ecological niche. The level of consciousness could get affected when they interact with their abiotic and biotic factors. The information that they gather from their surroundings could be entirely different, unlike human consciousness. Now the question arises, why there is a difference? In mid-1990's, Hameroff and Penrose proposed that human's consciousness depends on biologically 'orchestrated' quantum computations in collections of microtubules within brain neurons.( Hameroff and Penrose, 2011) Then what are the structures that are responsible for the consciousness in mosquitoes? Are they like microtubules or different? This is a subject of research and we are in search of these structures.

Many single cell organisms/microbes are sensitive or can say are conscious to physical vibrations, heat, pH, electrical and magnetic field, light, particular chemicals and even to the presence of other living organisms of different or alike in its surroundings. Rein stressed that the assembly of molecules, as in cells, tissues or organs will also produce certain collective frequencies. (Rein, 2004) Emission of such radiations indicates presence of a biological field. Following these clues, we attempt to study the biofield of these single cell organisms in groups and colonies, also to study the nature of biofield between different species of microbes.

Now, the question is how consciousness got synthesized in microbes and what is the level of their consciousness? Does consciousness regulates their behavior? How can we directly or indirectly measure their consciousness without altering their natural form? The answers are still awaited, warrant immediate attention. One more aspect of measuring consciousness in microbes involves the possible role of a tubulin like proteins. Norris (1998) observed the direct involvement of consciousness in control mechanism for regulating bacterial cell cycle. He questions, are bacteria conscious only when their tubulin like protein forms a ring? (only during birth?) or formation of rings generates consciousness or consciousness generates formation of ring? This has to be investigated in order to understand the origin of synthesis of consciousness in living beings and for that we must look for clues in the prokaryotes.

We firmly believe here that human beings, animals and microbes do possess emergent properties such as emblematic biofields that positively has correlation with their consciousness and non-invasive techniques will definitely be able to give some evidences in the form of direct-indirect correlates of consciousness and its possible evolution from the prokaryotes (microbes) to eukaryotes (mosquitoes, snails, animal and man). A significant work has been reported by

Walling in order to study the dynamics of consciousness, he looked for signs of nonlinear dynamics in eleven different fauna: anemone, starfish, earthworm, moth larva, crayfish, minnow, perch, catfish, frog, dog, and human. He wanted to see whether an increase in mathematical sophistication across species correlated with preconceived notions regarding evolutionary ranking in the central nervous systems of the animals and concluded that the appearance of consciousness was a revolutionary development, not merely an evolutionary improvement. (Walling, 2003)

A biological view of consciousness (and unconscious) brains reveals a trove of new insights. It has now become ethically required for scientists to describe their laboratory animals as 'conscious'. A vast body of evidences indicates that consciousness is a brute biological fact. It occurs in highly predictable ways in certain kinds of brain, unclear well studied conditions. The conscious brain has numerous established properties (Baars, 1988; Edelman, 1989, 2012; Seth et al. 2005). Therefore, animal consciousness is no longer based upon speculation or abstract philosophy. In this present investigation we will attempt to study and measure the consciousness in microbes, animals and man and delve into the probable evolution of consciousness, and it's scaling on the timeline. It will be interesting to find out the phenomenology and the possible reason behind the evolution of consciousness from its simplest form (sense in microbe) to the most complex form (qualia in man). Also, we will search for the tubulin like proteins in the other organisms other than man to explore the possible role of such proteins in synthesis of consciousness.

## REVIEW OF LITERATURE

A good review of relevant literature related to the possible methods of measurement and scaling the consciousness will lead us to find the most of the probable answers. The consciousness has been an integral part of ancient Indian culture in the form of Vedas'. They are the oldest literature and are the basis of the eastern philosophy on consciousness. This approach to understand consciousness was restricted to the philosophers and spiritual practitioners, but today even western researchers are attracted towards its seamless knowledge. However, we will limit ourselves to explore the vedantic approach towards understanding consciousness in this present investigation.

Earlier, Planck (1931) concluded "I regard consciousness as fundamental. I regard matter as derivative from consciousness. We cannot get behind consciousness. Everything that we talk about, everything that we regard as existing, postulates consciousness". Chalmer (1995) has argued that Access consciousness can in principle be understood in mechanistic terms, but that understanding Phenomenal consciousness is much more challenging: he calls this the 'Hard Problem of Consciousness'. He further explains, what emerges is the current lack of a basic theory of shared links between the occurrence of conscious events and neural bases of the brain, this is the same problem, the hard problem. Since then many workers (Block, 1998) proposed many theories and their experimental data to bridge the gap between the phenomenal consciousness and access consciousness measurement, but there is no universal acceptable way to do it. Penrose and Hameroff (2011) elaborated the concept of consciousness, Consciousness implies awareness: subjective experience of internal and external phenomenal worlds. Consciousness is central also to understanding, meaning and volitional choice with the experience of free will. Man's views of reality, of the universe, of ourselves depend on consciousness. Consciousness defines human existence.

Seth (2010) advice a mature science of consciousness requires effective means for measurement of conscious content and conscious state, both for mapping experimental evidence to theory and for designing perspicuous experiments. Measures of consciousness can be objective (e.g., behavioral responses, measured brain signals) or subjective (e.g., introspective reports, confidence ratings). While it is unlikely that any single measure will prevail, recent advances have involved combining in single experiments multiple measures of both kinds.

Rubik (1995) proposed that living structures and functions are orderly, and their biological oscillations are organized in meaningful ways. They contribute information to a dynamic vibratory network that extends throughout the body and into the space around it. Later, (Rubik, 2002) studied the energy emission of human body and suggested that all of these emissions are part of the human energy field, also called the biologic field, or biofield. The biofield is also elusive. We cannot isolate it or analyze it comprehensively. As Muir (1911) wrote, "if we try to pick out anything by itself, we find it hitched to everything else in the universe". For a field, this connection is especially true, given that, regardless of its source, it travels outwards to infinity, interacts with other fields by superposition, and interacts with matter along the way. However, most researches in this field have focused on electromagnetic aspects of the biofield, with some new noninvasive methodologies. Rein (2004) stressed that the assembly of molecules, as in cells, tissues or organs will also produce certain collective frequencies. Emission of such radiations indicates presence of a biofield.

Many single cell organisms/microbes are sensitive or can say are conscious to physical vibrations, heat, pH, electrical and magnetic field, light, particular chemicals and even to the presence of other living organisms of different or alike in its surroundings. Pepperberg and Lynn (2000) suggest that various species exhibit different levels of awareness attuned to their ecological niches. The question is how consciousness got synthesized in them and what is the level of their consciousness? Does consciousness regulates their behavior? How can we directly or indirectly measure their consciousness without altering their natural form? The answers are still awaited, warrant immediate attention. Norris (1998) observed the direct involvement of consciousness in control mechanism for regulating bacterial cell cycle. He questions, are bacteria conscious only when their tubulin like protein forms a ring? (only during birth?) or formation of rings generates consciousness or consciousness generates formation of ring? He further suggests, this has to be investigated in order to understand the origin of synthesis of consciousness in living beings and for that we must look for clues in the prokaryotes. But, will investigation of prokaryotes be sufficient? Positively the answer is no. We have to study the whole phenomenology of evolution of consciousness starting from the microbes, invertebrates, vertebrates to humans.

Much about the consciousness of the prokaryotes has been discussed but there is no significant research as such published on the consciousness measurement of mosquitoes. Mosquitoes, one of

most notorious medically significant Dipteran do possess different senses and a level of consciousness, which do reflect in their behavior within their ecological niche. The level of consciousness could get affected when they interact with their abiotic and biotic factors. Assuming the behavioral observations this investigation will be an attempt to find out the evidences of consciousness in mosquitoes.

The kingdom Animalia have plentiful living diversity of organisms but Man is the most desired for the consciousness research, but however, other animals who we know 'are they conscious'? Walling et al. (2003) accepts that the nature and location of consciousness in humans remain a mystery. The presence or absence of conscious awareness throughout the remainder of the animal world is still disputed. Animal consciousness may still well be limited to simple perceptual consciousness but they can't be denied of possessing a conscious. Griffin and Speck (2003) reported and discussed extensively the experimental and observational data about the complexity and versatility of animal cognition, since the subject was reviewed in the first issue of this journal (Griffin, 1998). The term cognition is ordinarily taken to mean information processing in human and nonhuman central nervous systems that often leads to choices and decisions. But the possibility that nonhuman cognition is accompanied or influenced by consciousness has received relatively little attention, largely because many behavioral scientists have been extremely reluctant to consider nonhuman consciousness on the grounds that it is impossible to obtain objective evidence about subjective experiences. However much has changed since then. Recently, Low et al. (2012) declared 'The absence of a neocortex does not appear to preclude an organism from experiencing affective states. Convergent evidence indicates that non-human animals have the neuroanatomical, neurochemical, and neurophysiological substrates of conscious states along with the capacity to exhibit intentional behaviors. Consequently, the weight of evidence indicates that humans are not unique in possessing the neurological substrates that generate consciousness. Nonhuman animals, including all mammals and birds, and many other creatures, including octopuses, also possess these neurological substrates. Now, when it is evident that animals do possess consciousness, then the evolution of consciousness from animal to man becomes a subject of interest. The present investigation is an attempt to roadmap the evolution process and its probable scaling from microbes to human including selected animals.



Now the question is How? How this objective will be achieved? Numerous workers are investigating evidences and correlate of consciousness in different animals, in order to roadmap the evolution of consciousness. Pregnolato (2010) put forward other researchers that have shown that bacteria and algae are capable of performing quantum computations at normal temperatures for the life from billions of years. Seth (2010) remarks, already many of us tacitly ascribe consciousness to primates and many other mammals, though ascription of full-fledged self-consciousness remains more controversial. Moving beyond mammals, perhaps a strong case can be made for birds (especially corvids and parrots) and there is tantalizing evidence of behavior consistent with consciousness in some cephalopods (e.g., *Octopus vulgaris*). Walling, (2012) proposed Non-Linear Dynamics (NLD) as a possible evolutionary pathway to consciousness. His work included animals like- anemone, starfish, earthworm, clam, crayfish, lobster, minnow, perch, catfish, toad, frog, turtle, bird, opossum, cat, dog, horse, goat and human. Still, none of these works is able to explain the phenomenon of evolution of consciousness in animals.

Following these clues, we attempt to study and measure the properties of biofield of microbes, animals and man with the help of suitable instruments. We also attempt to find out the evidences of probable roadmap of evolution of consciousness, with its possible scaling in the living organisms.

Our Laboratory has been actively participated in novel areas of consciousness studies. Prakash (2013) Man- An ideal equipment for the measurement of consciousness. Prakash (2013) Intersecting Universal Consciousness with Experiences, Experiments and Intuitive Consciousness with Special Reference to the Discovery of God Particle and Universal Consciousness. Richa and Prakash (2013) Consciousness Measurement Problem in Man, Mosquitoes and Microbes: A Review. Prakash (2012) Evidences and Measurements of Consciousness from Sciences and Spirituality: An analysis. Prakash (2011) Introspects and Prospect of Orchestrated Reduction Theory: Understanding Quantum Consciousness Generation and God Realization? Prakash (2009) Essentials for God Speed in Spiritual Awakening: A Beginners Paradigm.

## **OBJECTIVES**

1. To investigate and study the biofield in the microbes, other selected invertebrates and vertebrates.
2. To study the significant factors responsible for generating the consciousness in microbes, mosquitoes and other selected vertebrates.
3. To study the tubuline like proteins in microbes, mosquitoes and other selected vertebrates.
4. To study biofield and consciousness in humans and to find out possible correlations between animals and in humans with relation to age, sex and behavior.
5. To ascertain and study the evolutionary parameters in consciousness and probable scaling of evolution.

## METHODS AND MATERIALS

To achieve the mentioned objectives in microbes, animals and man, the following methodologies are proposed.

### METHODOLOGY AND PROTOCOL

To evaluate the biofield and its correlation with consciousness MEAD will be used. This will help us in characterization of energy frequency of the animal under observation. (Chaturvedi et al. 2012, 2013)

To study the energy emission of the selected organism under investigation GDV Apparatus will assist in the investigation. (Korotkov et al. 2009, 2010)

MEG and EEG will help in mapping brain activity and to study electrical activity of the organism under investigation. (Satsangi and Sahni, 2012, 2013; Walling, 2003, 2013, Oschman, 2000, 2002)

For analysis of tubulin like proteins from the organisms under investigation; extraction, separation and identification will be performed with suitable techniques. (Tuszynski et al. 2008; Fourest-Lieuvain, 2006; Caudron, 2000; Chaudhuri et al. 1998)

To analyze data we will explore it through the software available like LABVIEW and MATLAB.

### MATERIALS FOR STUDY

The following groups of species have been selected to pursue consciousness studies and to compare results-

- **MICROBES** – The selected microbes will be *Bacillus subtilis* and *Bacillus thuringiensis israelensis*.
- **INVERTEBRATE** – Larval stages of *Culex quinquefasciatus*, *Anopheles stephensi* and *Indoplanorbis exustus*.
- **VERTEBRATE** – *Bos indicus* and *Bubalus bubalis*.
- **MAN** – With reference to individuals and population sizes, and with different age, sex and food habits/life style.

## PRELIMINARY WORK DONE IN MOSQUITO LARVAE AND MICROBES

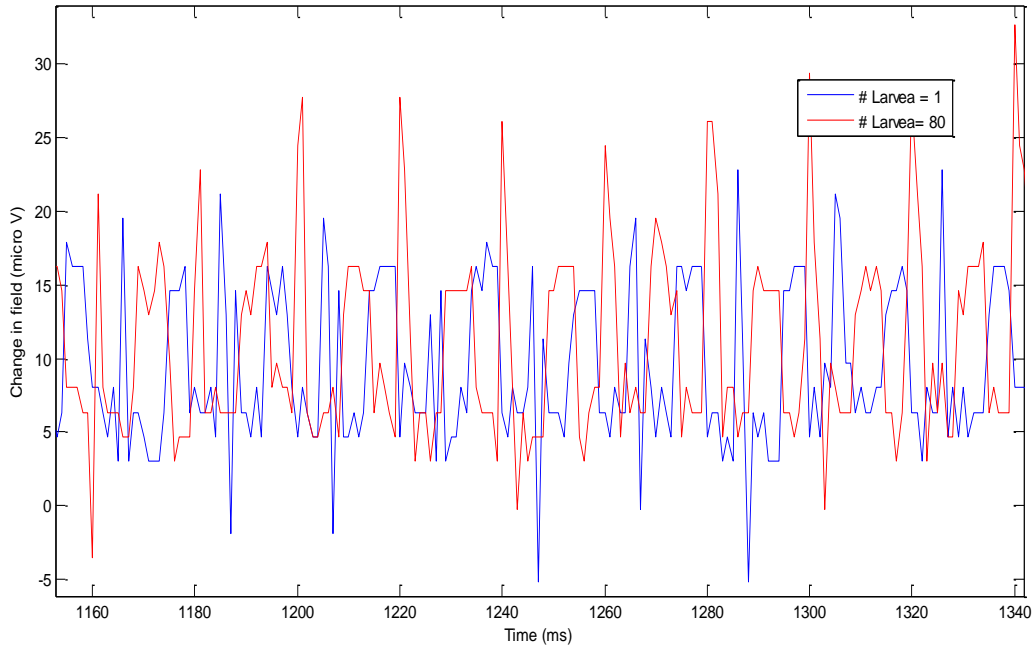


FIGURE 1. Graph between change in field and time of fourth instar larvae of *Culex vishnui* with two different population sizes with magnetometer

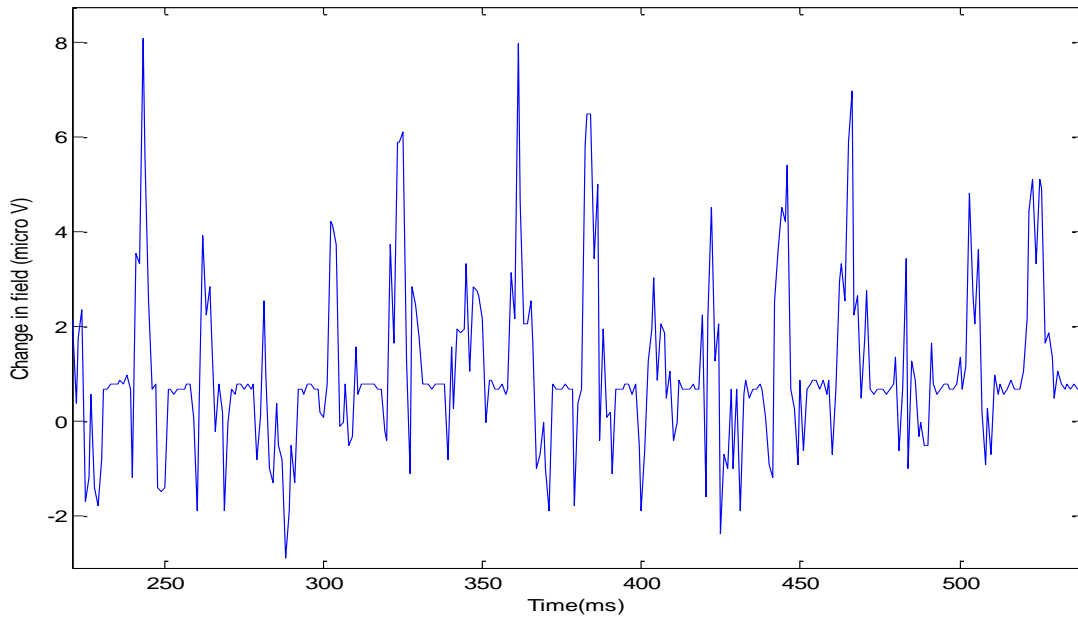


FIGURE 2. Graph between electric field and time of *Bacillus subtilis* (72hr) with magnetometer

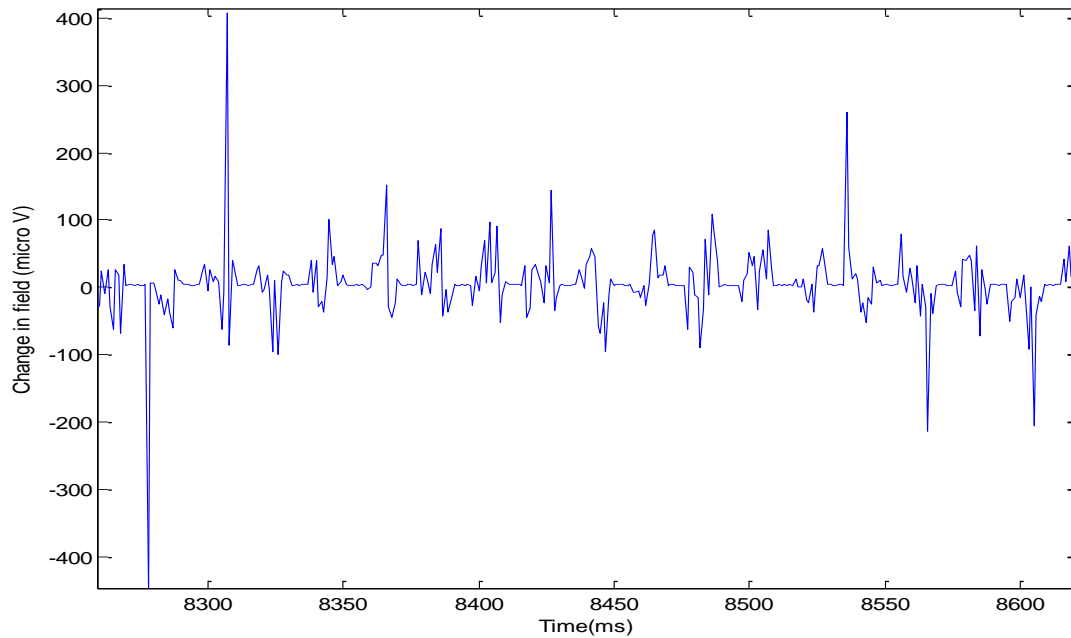


FIGURE 3. Graph between change in field and time of *Bacillus thuringiensis israelensis* (72hr) with magnetometer.

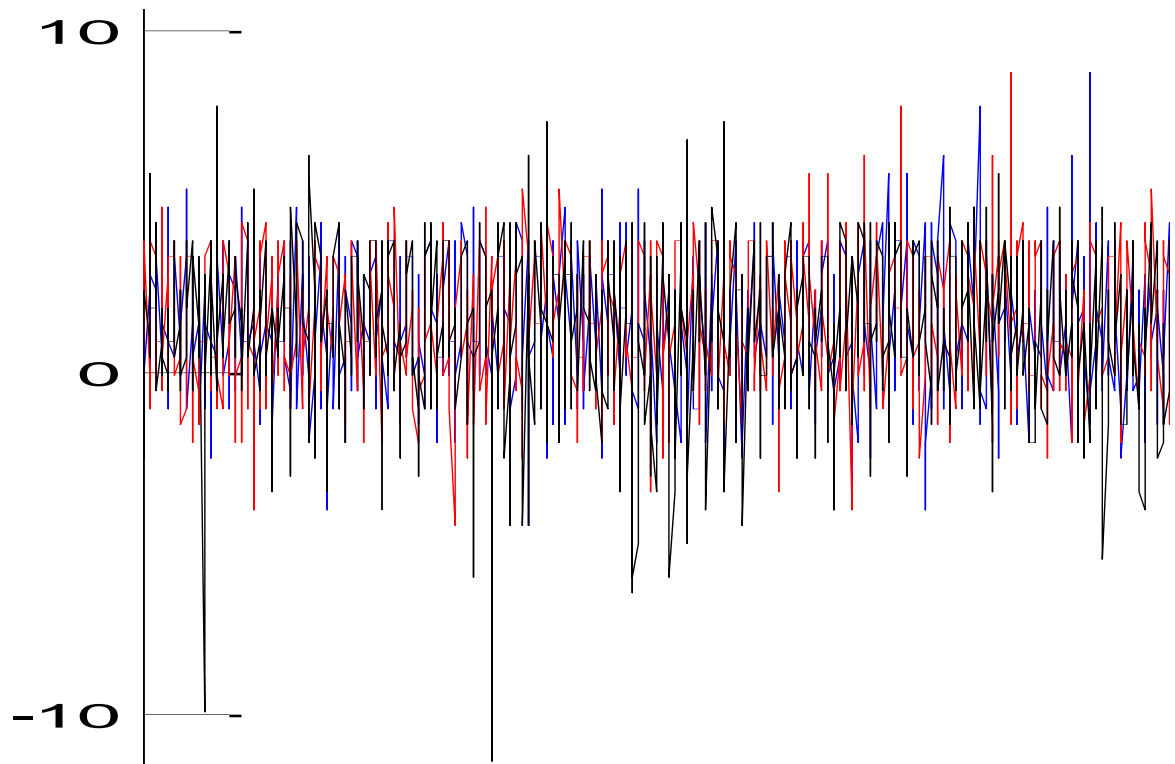


FIGURE 4. Graph between electric field and time of *Bacillus thuringiensis israelensis* (72h) and *Bacillus subtilis* (48h, 72h) with magnetometer

- *Bacillus subtilis* (48 h)
- *Bacillus subtilis* (72 h)
- *Bacillus thuringiensis israelensis* (72 h)

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