Journal of Scientific Exploration, Vol. 32, No. 3, pp. 495–513, 2018 0892-3310/18

RESEARCH ARTICLE

The Effects of Geophysical Anomalies on Biology

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Submitted February 7, 2018; Accepted May 12, 2018; Published June 30, 2018

DOI: https://doi.org/10.31275/2018.1295
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Abstract—The effect of location and its geophysical properties on biology has been known since ancient times. This paper makes an attempt to define geophysical anomalies, analyze the various parameters that constitute them, and analyze the mechanisms through which these anomalies interact with human biology, flora, and fauna.
Keywords: geophysical anomalies—earth radiation—magnetic field—bioelectromagnetism

Introduction

The science of geobiology concerns the study of the ways in which a site and its various characteristics affect the development of the biosphere.

Hippocrates, the father of Medicine, in his work *Concerning Nutrition*, mentions that the geographic location and ground typology are equally important health factors as nutrition is. He states (Figure 1):

> The success of proper diagnosis lies in the fact that the physician must know the nature of man as a whole. Human health, in order to be achieved and maintained, needs proper nutrition in proportion to gender, age, work, yearly season, climatic change, in sync with the geographical location of the place where one lives and the prevailing conditions, the typology of the soil, and finally the influences of the sun, moon, and universe in our lives. (Hippocrates 1992: Paragraph 2 [Ιπποκράτης, Περί Διατροφής, παρ. 2])

Δεῖ δὲ, ὡς ἐοικε, τῶν πόνων διαγινώσκειν τὴν δύναμιν καὶ τῶν κατὰ
φύσιν καὶ τῶν διὰ βίης γινομένων, καὶ τίνες αὐτῶν ἐς αὔξησιν
παρασκευάζουσι σάρκας καὶ τίνες ἐς ἔλλειψιν, καὶ οὐ μόνον ταῦτα,
ἀλλὰ καὶ τὰς ξυμμετρίας τῶν πόνων πρὸς τὸ πλῆθος τῶν σιτίων καὶ
τὴν φύσιν τοῦ ἀνθρώπου καὶ τὰς ἡλικίας τῶν σωμάτων, καὶ πρὸς τὰς
ὥρας τοῦ ἐνιαυτοῦ καὶ πρὸς τὰς μεταβολὰς τῶν πνευμάτων, καὶ πρὸς
τὰς θέσεις τῶν χωρίων ἐν οἷσι διαιτέονται, πρός τε τὴν κατάστασιν
τοῦ ἐνιαυτοῦ. Ἀστρων τε ἐπιτολὰς καὶ δύσιας γινώσκειν δεῖ, ὅκως
ἐπίστηται τὰς μεταβολὰς καὶ ὑπερβολὰς φυλάσσειν καὶ σίτων καὶ πο
τῶν καὶ πνευμάτων καὶ τοῦ ὅλου κόσμου, ἐξ ὧν περ αἱ νοῦσοι τοῖσιν
ἀνθρώποισι φύονται.

Figure 1. Original text from *Concerning Nutrition* by Hippocrates in ancient Greek.

It has been observed that the various features of the subsoil, its morphology, and its composition, may create beneficial or adverse effects on humans, flora, and fauna.

Architecture, as currently practiced, does not take into account the possible effect of the ground from the point of view of geophysical anomalies created by various geological features.

Earth radiation anomalies are related to various phenomena, such as the piezoelectricity, radioactivity, geochemical gases, seismic faults, gravity anomalies, electromagnetic emission, electro-kinetic phenomena of subterranean water flow, spinning electric fields, ion flow, conductivity discontinuities, non-dipolar magnetic fields, geoplasma, and geoneutrons. Specific geological materials can also alter and/or augment these phenomena.

This paper considers the physical aspects of these anomalies, and the way they can interact with biology—in particular how they can affect humans, animals, and plants.

The human body, via different parameters, can interact with these phenomena, due to the existence of magnetite, iron, silica, and water, and also its own electromagnetic fields. Research has shown that long-term exposure at geologically stressed locations can have diverse negative effects on people, especially on brain activity, blood health, and the immune system.

Various similar effects have been noted on flora and fauna. There are studies that have shown the significant effects of these anomalies on laboratory animals with clear results focused on malignancies.

Furthermore, there are indications that different types of geophysical anomalies can affect plants, and various parameters are responsible for the result in yield, weight, shape, and time growth.

Geophysical Anomalies

Classification

Geophysical anomalies are the zones within which significant changes take place in the parameters of various fields, such as the natural magnetic, gravitational, and electric fields. These are locally distorted due to underlying geological features, and the resulting anomalies are measurable. The existence of some local differentiation of the subsoil can be scientifically analyzed and gives an explanation of the results.

The specific phenomena associated with geobiology are the following.

Piezoelectric or piezomagnetic effect. Concerns the electrical charge accumulated in certain solid materials (such as crystals with defects, certain ceramics, and biological matter such as bones, DNA, and various proteins) as a reaction when mechanical stress is applied (Hacker, Pauser, & Augner 2011, Freund 2003, Adler, Le Mouel, & Zlotnicki 1999).

Hydrogeophysical phenomenon is the low-intensity electric current, and hence the magnetic field associated with it, created by the friction between groundwater and porous limestone rocks, as the water molecules attempt to pass though the rock's micro tunnels within its matrix (Burke & Halberg 2005, Yang, Kostiuk, & Kwok 2003, Adler, Le Mouel, & Zlotnicki 1999).

Radioactivity is the presence of radioactive materials such as granite, and others, that create conditions for the emission of radioactivity (United Nations Scientific Committee 1993).

Geochemical gases are the release of geochemical gases, such as radon caused by a variety of complex geological conditions within a severe seismogenic environment (United Nations Scientific Committee 1993).

Ion flow concerns an upward flow of positive or negative ions emanating from geological formations (Burke & Halberg 2005).

Strong magnetic, electrical, or electromagnetic anomaly concerns the strong local difference in the magnetic, electrical, or electromagnetic properties of the underlying geological structures, which differ in magnetic susceptibility and electrical conductivity, respectively (Florinsky 2010, Burke & Halberg 2005, Persinger 1987).

Strong gravity anomaly is the sudden local variation of the gravitational field intensity, and is related to the change in density of adjacent geological structures (Florinsky 2010, Gak & Gridin 2008).

Tectonic faults are the creation of an electromagnetic field in a pre-seismic period (Florinsky 2010, Shitov 2006, Persinger 1987).

Non-dipolar magnetic field concerns the flow of a non-dipolar magnetic field (Miller & Lonetree 2013).

Ground electric potential anomalies. Concerns the creation of electrical potential in contacts of geological structures with different electrical properties (Burke & Halberg 2005).

Geoplasma. Concerns the emanation of low energy plasma related to geo-anomalies and heterogeneities in the structure of geophysical fields (Mamirova 2010).

Geoneutrons. Concerns anomalies in the flow of neutrons emanating from geological structures (Langer 2008, 1997).

Geo-Electric Phenomena

The Earth's electromagnetic field is a result of the interaction between the magnetic field originating from the melted iron–nickel core of the planet and the charged ionosphere gases. The diurnal fluctuations in the geomagnetic field depend on the solar motion and the solar winds. It also varies according to the lunar day and the month, and annually depending on the distance from the sun.

The Earth's surface and the ionosphere create an electrodynamic cavity producing micro-pulses in the magnetic field in extremely low frequencies, from about 7.83 Hz to 25 Hz (Schumann Resonances). Most of the micro-pulses energy is concentrated at about 10 Hz. Solar flares disperse charged particles in the earth's field, causing magnetic storms. These particles have already been incorporated in the outer boundaries of the field (the Van Allen belt), which protects us from their absorption and other high energy cosmic rays (Becker & Selden 1985).

The phenomenon of induction refers to the change in the intensity of the magnetic field, which will generate an electrical current in any conductive substance present. Consequently, the daily fluctuations in the intensity of the geomagnetic field produce the so-called telluric currents running through the ground near the surface.

These telluric currents produce their own magnetic field, which will amplify or weaken the geomagnetic field according to its polarization. The change in the magnetic field is proportional to the change in the telluric current's intensity, following a ratio known in science (Hessler & Wescott 1959).

Geological Phenomena

When two different types of geological sub-rock or even sub-soil are in contact, a conduction discontinuity is created that can weaken or potentiate the daily magnetic fluctuations, sometimes more than one hundredfold (Rikitake & Honkura 1986).

This change in the magnetic field creates additional electrical charges, so in these areas the electric currents of the ground are much higher than the surrounding area. Telluric electric currents attract electrically charged air molecules of the opposite charge.

Rocks such as basalt, volcanic lava, limestone, granite, and others with a high content of clay, magnetite, iron, magnesium, or other metals exhibit high electrical conductivity, thus becoming channels for any electric current, such as the one created by an underground water flow. In particular, some types of granite typically emit radon and neutrons. Radon and radiation create ions (Burke & Halberg 2005).

Copper-rich rocks are particularly conductive, as copper is one of the most electrically conductive metals. Quartz-rich rocks create the piezo-electric phenomenon, as they have the ability to store electrical charges, produced in their crystal lattices' defects due to tectonic stresses, like no other mineral; they are therefore used in watch construction. Furthermore, the soil's ability to conduct electricity is proportional to its water content (Burke & Halberg 2005).

The presence of limestone has a strong interaction with water flow, as its geological interstructure is perfect for the production of natural electricity by hydro-geophysical means as described below in the next section. Electrons are removed from the rainwater as it passes through the porosity of the rock and are attached to it, in a process called adsorption (Mizutani et al. 1976).

Hydro-Geophysical Phenomena

Therefore, water molecules now have a positive charge and have left the chalk with a negative charge. The phenomenon becomes double-strengthened as water dissolves in chalk. Calcium carbonate molecules will be broken down; during this phenomenon, the calcium rock is charged negatively by the free electrons extracted from the water molecule, leaving the water molecules positively charged (Burke & Halberg 2005).

The overall result is that chalk has a significant negative charge and the flowing water is positively charged. As we know, the opposite is attracted and thus an electric charge is created in the ground. The movement of water by itself will create a magnetic field the fluctuation of which depends on the porosity of the rock, and chalk is extremely porous (Martin, Haupt, & Greenfield 1982).

Current densities of $2.5 * 10^{-4}$ amp/m² can be generated by constant groundwater migration in artesian aquifers. These DC currents are sufficient to generate magnetic anomalies exceeding 200 nT in both the Menindee Trough (Australia) and the Karoo Basin (South Africa). Telluric currents

associated with ionospheric activity can be detected by variations in magnetic induction, but constant offsets associated with streaming potentials and geochemical activity (SP anomalies) are obscured by noise. Consequently, some regional magnetic anomalies may be wrongly attributed to variations in magnetic susceptibility with residuals explained by remanence (Cull & Tucker 1986).

Scientists studying the La Fournaise volcano near Madagascar found that underground water flow through volcanic rocks can generate electricity, too (Adler, Le Mouel, & Zlotnicki 1999).

Also, a team of scientists, making measurements at Popo, a Mexican volcano, noticed similar results, measuring very high electrical charge sizes at that site, coming from the geological background (Markson & Nelson 1970).

The ability of water to produce electric charge can be seen with a Kelvin water dropper (Thomson 1872).

Light and Other Phenomena

Many strange self-luminous phenomena are often manifested predominantly above seismic faults, but also above powerful geo-anomalies associated with strong metallic content without seismic record. Frequently they are manifest as colorful spheres but also they have other shapes, which are basically an indication and a result of a flowing electric current. As Dr. Levengood explains, the already electrified air molecules absorb the extra energy from the photons of a camera's flash, and are driven to an even higher energy state. Dr. Bruce Cornet, a geologist, mapped the locations of several such bright events and noticed that they were concentrated on a line of strong negative magnetic anomalies (Burke & Halberg 2005).

Also, light manifestations have been observed to pass through the ground in pre-seismic periods, due to the pressure stress of pressured rocks that emit electromagnetic signals (Kerr 1995). In the laboratory, this pressure caused similar luminous spheres, even in non-quartz rocks (Brady & Rowell 1986).

Specialists in light sphere emanations have estimated that 5kV/inch DC electric fields are enough to produce a glowing sphere of ionized air (Powell & Finkelstein 1970).

Engineer Lonetree describes the phenomenon of the non-dipolar field:

> As the outer core rotates, a magnetic North and South Pole are created. During this process another form of magnetism is produced, non-dipolar in nature. This magnetism that does not have north or south. It's just pure magnetic energy. Most of this free energy is absorbed by the primary dipole,

(North/South) sector, but a portion of it can reach and penetrate the surface of our planet. Inside the earth, non-dipole magnetism takes the form of a vortex-like (spiral or circular) shape that shows up and down movement. (Miller & Lonetree 2013).

Parameters

The parameters involved in a geophysical anomaly are the following:

- Soil and air conductivity
- DC magnetic fields
- Rotating electromagnetic fields
- Air ion intensity
- Soil temperature
- Ground and air humidity
- Seismic activity
- Infra- and ultrasounds
- Radioactivity
- Existence of groundwater
- Existence of faults
- Gravity intensity
- Geoneutrons
- Scalar waves
- Existence of quartz or magnetite in the subsoil

The strongest effects of electromagnetic forces occur on the boundary of a disturbed zone, and not at the center. On the boundary of such electrical conductivity discontinuities, extreme instabilities are observed in the vertical component of the geomagnetic field (Rikitake & Honkura 1986). The phenomenon of the intensity of these phenomena is *strengthened* at sites where the boundaries of magnetic, seismic, and gravitational zones *cross* (Burke & Halberg 2005).

Interaction with Biology

Effects on Humans

According to researchers, there is a disease associated with geophysical anomalies of the subsoil (Derek 1994) that affects the normal functioning of the body and can be described as a geo-pathogenic region disease (Kharat 2000).

The effect of natural electromagnetic waves and various types of geo-anomalies on human biology is obvious, due to:

- The presence of magnetite and magnetic crystals in the brain, the area of the ethmoid, and the ears (Kirshivink, Kobayashi-Kirshivink, & Woodford 1992, Barinaga 1992, Ruttan, Persinger, & Koren 1990)
- The presence of iron in the blood
- The body's composition of 70% water, which has high electrical conductivity and creates magnetic crystals (Fesenko & Gluvstein 1995)
- The property of tissues to function as semiconductors without special resistance, known as the non-thermal effect (Oschman 2000)
- The production of electromagnetic fields from the heart and the brain, the electrical transmission of signals through the nerves. The *strongest* electromagnetic field is that of the heart, *100 times higher* than that of the brain (McCraty 2003)

Humans and all living beings are, among other things, a network of the production, reception, and emission of electromagnetic fields. The electrical function of the various systems, the iron particles in the cells, the function of the proteins as semiconductors of the cell membrane components, and the intra- and extracellular water as liquid crystals, constitute biology as producer, transmitter, and receiver of electromagnetic information. It is known that cell-body microtubules are conductors of electromagnetic waves (f = 1013 Hz with their harmonics at λ = mm) that coordinate cellular functions (Rahnama, Tuszynski, & Bókkon 2011), and that centrosomes contain silicon oxides and emit and receive electromagnetic signs.

The human body produces a series of fundamental electromagnetic frequencies that are characteristic of its structure and function (Andreev, Beliy, & Sit'ko 1984). Today, measurements of various functions can be made with modern magnetometers such as the SQUIDs, Nuclear Magnetic Resonance (NMR), and Magnetic Resonance Imaging (MRI) devices. In 1970, Russian and Ukrainian radio physicists discovered that there is resonance of tissue and cell coordination with very high frequency and low-intensity radio waves. Thus for the first time the resonant frequencies of humans, animals, and other components (biological and chemical substances) were recorded (Kositsky, Nizhelska, & Ponezha 2001). The transmission and recording of very low photon intensity activity (biophotons) from the human body, of a different frequency for each organ, is another important indication of the presence of fields (Cohen & Popp 2003).

Bioinformatics has shown that communication—the language of the body—is electrical and chemical. Nerve electrical stimuli contain information, and biochemical compounds-signals contain information to be executed, encoded within their structure. Cells are full of recipients of

information (receptors) and contain all functional structures and biochemical pathways for translation and transfer of this information to the cell nuclei for execution (Oschman 2000).

Electromagnetic fields change the cell's transmissibility to ions, with an increase in calcium intake. They also alter gene expression and signal transduction inside the cells (Habash 2008).

There are two kinds of magnetic fields that have been found: The first is the one within human beings and other living beings, which is *produced* during *the transfer of ions to the nerves*, as well as the functioning of the heart and brain; the second is the Earth's own magnetic field generated from its liquid core and rotation. It seems that the two fields interact and affect the bodily activities of living beings. Becker and Selden (1985) reported that the normal geo-magnetic field plays an important role in maintaining within normal limits the direct current system of controlling bodily functions.

The SQUID magnetometer has also identified the existence of a DC peri-neural field, which produces mainly in the brain constant DC magnetic fields on the order of *one billionth* of the intensity of the geomagnetic field, which is on average about 50,000 nT. Experiments on snails have shown the dependence of biorhythms on the Earth's magnetic field.

The main process of cell division in which cell chromosomes are broken down and aligned and distributed equally between the two cells lasts only a few minutes. Several longer stages are needed, one of which is the duplication of all cellular DNA. All stages together last one day. Therefore, cell growth and repair, which is based on the regulation of cell division, is synchronized with the Earth's magnetic field (Becker & Selden 1985).

Becker and Selden (1985) made an experiment to observe the dependence of the main human biorhythms on the geomagnetic field. They isolated two groups of people in two underground rooms, one of which was blocked from any activity indicative of the passage of time, and the other blocked also from the geomagnetic field. He found that in both rooms there was a disturbance of the biorhythms, which was translated as an extension of the rhythms in the room that had been blocked from the geomagnetic field. When volunteers in this room were exposed to a 10 Hz frequency range (0.025 V/cm), similar to Earth, the rate disorder was restored (Becker & Selden 1985).

Detailed studies show that all vertebrates have a similar magnetic instrument in the area of the ethmoid, and this instrument transmits biorhythmic time elements from the microarrays of the geomagnetic field to the pineal gland (Becker & Selden 1985).

Scientists in India decided to measure the effect of electromagnetic fields of different frequencies on humans (Subrahmanyam, Narayan, &

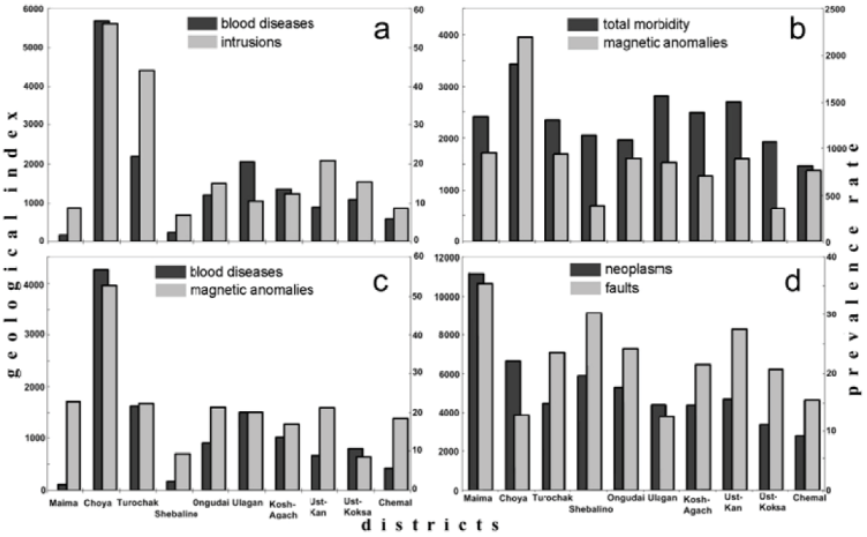

Figure 2. Relationships between prevalence rates in the adult population and geological indices in 2002.
(a) blood diseases versus intrusions
(b) total morbidity versus magnetic anomalies
(c) blood diseases versus magnetic anomalies
(d) neoplasms versus faults (Shitov 2010)

Srinivasan 1985). The parameters recorded were cardiac pulse, pressure, brain waves, and blood levels of neurotransmitters. They noticed that volunteers had the most reactions at frequencies of 0.01 Hz in direct current and 50 nT in a produced magnetic field. The above are characteristics of daytime variations of the geomagnetic field and especially in an area with anomalies (Burke & Halberg 2005).

Shitov (2010) found a very strong correlation among blood, nervous, respiratory, and genito–urinary system diseases and geophysical anomalies (Figure 2).

Persinger and Psych (1995) studied geo-anomalies' influences in connection with investigations related to unexplained deaths in epilepsy patients that are maximized at sunrise as the fluctuations of the geomagnetic field peak just before sunrise. Michael Persinger stated:

> Temporal and regional variations in psychological processes have been associated with three geological factors: geochemical features, geomagnetic changes, and tectonic stress. In the geochemical field, the presence of copper, aluminum, zinc, and lithium can affect the incidence of thinking

> disorders, such as schizophrenia and senile dementia. These common elements are found in many soils and groundwater.
>
> Geomagnetic abnormalities have been associated with increased anxiety, sleep disturbances, altered mood, and a higher incidence of psychiatric admissions. Transient and local epidemics of strange and unusual behaviors are sociological phenomena, which have increased before seismic activity has increased in a region, and are associated with tectonic strain.
>
> Many of the modern associations between geological parameters and human behavior are evident in historical data. The effects of geophysical and geochemical parameters on human behavior are often complex and are not detected by the limited scope of most studies. (Persinger 1987)

He also concludes that cerebral function associated with consciousness responds to subtle changes in geomagnetic activity. Measuring the results of the same changes in his laboratory, he noticed that they had a direct effect on the electrical sensitivity of brain cells (and in extreme form caused seizures) and influenced the ability of individuals to concentrate during the day. He chose in his experiments to reproduce the magnetic field variation of 50 nT that is consistent with the fluctuations usually occurring in nature.

The above confirms that all human beings are permeated with the geomagnetic field, and we are connected to it, as well as all the secondary fields resulting from this connection. As a result, very small changes in geomagnetic field activity directly affect human biology, and create the ability to change one's brain without humans realizing it (Persinger & Levesque 1983).

In the research done by Rudnik and Melnikov (2010), it was clearly shown that cancer incidence was greatly augmented in the intersection of fault lines (Figure 3).

Geophysicist Andrei Apostol used his own device to measure the number of muscle contractions in volunteers as they moved into different geological backgrounds. The results showed a strong correlation among muscle contractions, gravitational anomalies, and geologic incisions (Apostol 1995).

A powerful example of a geo-anomaly is the so-called Cliff of Tears, an area in North America where visitor feedback revealed that male visitors would nosebleed, while women had sudden menstruation. David Barron, director of Gungywamp Swamp in Connecticut, conducted an experiment with 20 volunteers and nurses who recorded a significant difference in blood pressure after exposure to the area (Burke & Halberg 2005).

In a research experiment done on more than 800 people, called the Vienna Report, a group of 20 scientists found significant results on people exposed to a geophysical anomaly. There were significant changes in

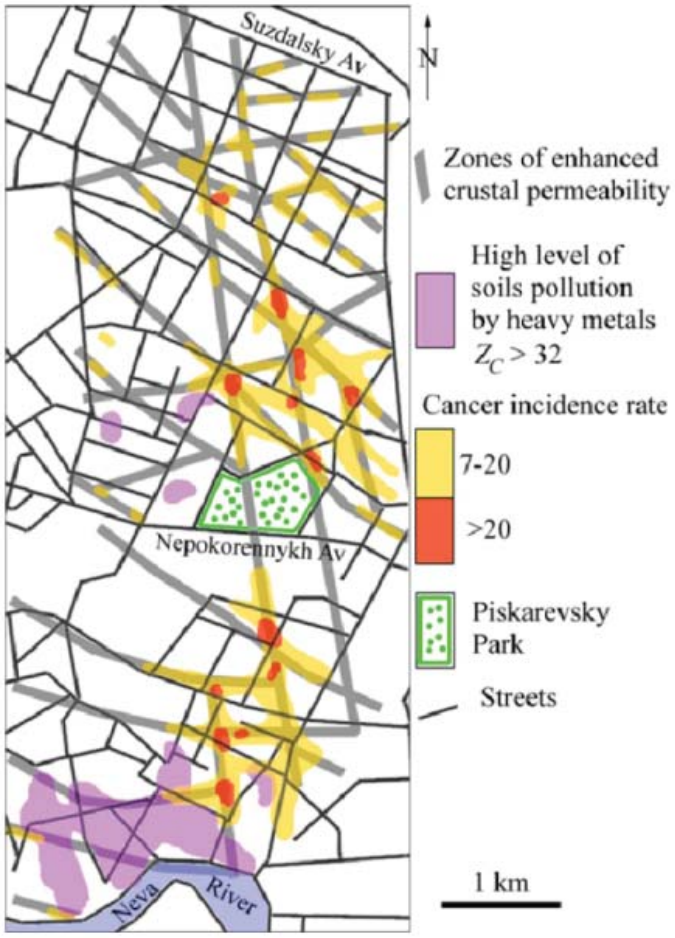

Figure 3. Portion of the Kalininsky District of Saint Petersburg: Cancer incidence rate (per 1,000 population) in the years 1991–1992, ZEPC, and areas marked by a high level of soil pollution with heavy metals (Rudnik & Melnikov 2010).

serotonin, zinc, and calcium levels, and also in immunoglobulins such as IgA (Bergsmann 1990).

Dubrov (2008) studied areas with geophysical anomalies and found that there was much higher morbidity regarding various diseases in comparison with areas having homogeneous geophysical parameters (Table 1).

Dharmadhikari defines *geopathic zones* as places on earth known for causing *health problems*. He and his team made measurements in individuals in a geopathic and a neutral zone. The results showed that the

TABLE 1

Incidence of Various Diseases in People Living on a Geophysical Anomaly and in an Undisturbed Zone (Dubrov 2008)

Disease	Geophysical Anomaly	Undisturbed Zone
Total	1205 ± 25	792 ± 5
Infections	45.4 ± 0.3	17.7 ± 1.9
Oncology	7.96 ± 0.15	5.58 ± 0.04
Mental	4.94 ± 0.08	1.14 ± 0.23
Hypertension	4.48 ± 0.17	0.83 ± 0.02

electrical potential of the body increased and skin resistance was reduced when they were exposed to a geopathic zone in comparison with the neutral zone (Dharmadhikari et al. 2011).

Aschoff (2014), a physician, was the first to use the blood's electromagnetic oscillations, which are measurable by a simple blood test (Aschoff et al. 1994). After 20,000 tests, he noticed that people with electromagnetically oscillating blood lived *without exception* in a disrupted geopathic zone, either in their sleeping area or in their workplace. Individuals with only magnetically oscillating blood were not exposed to a geopathic disorder and were healthy. Due to the stress from the electric current and radiation (mostly gamma ray) emitted by a geopathic zone, the blood loses its natural structure and becomes electrically polarized in the opposite charge. Aschoff also mentions that neutron radiation emitted by geopathic zones can cause mutations in the cells.

Hacker, also a medical doctor, reports that longitudinal scalar waves emitted at different locations can cause various effects in the form of symptoms on biological systems. Together with his team, he conducted experiments using Dr. Korotkov's GDV (Gas Discharge Visualization), while making Immunoglobulin-A (IgA) and A-Amylase measurements. The results were in complete harmony; as in the higher GDV mean area, IgA levels were also higher, indicative of relaxation; and in the geopathic zones with lower GDV Mean Area, A-amylase was higher, indicative of a stress state. Corona Discharge diagrams of GDV showed weakening of the immune system and epiphysis function in the case of exposure to the geopathic zones (Hacker, Augner, & Pauser 2011) (Figure 4).

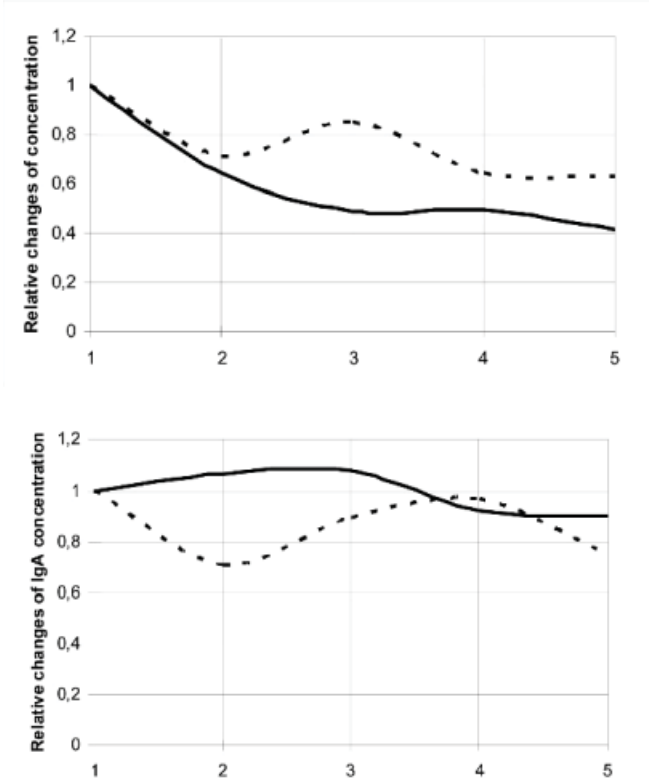

Figure 4. TOP: The normalized time course (9:00 a.m. to 1:00 p.m.) of the cortisol concentration in saliva obtained at a potential "neutral zone" (black line), and at a potential "geopathic stress zone" (dotted line). Note that the stress zone in times led to increased cortisol levels compared with those obtained from the more neutral place.
BOTTOM: The normalized time course (9:00 a.m. to 1:00 p.m.) of salivary IgA measured at a potential "neutral zone" (black line), and at a potential "geopathic stress zone" (dotted line). The potential stress zone gave a slightly different time course to that obtained at the more neutral place (Hacker et al. 2008).

A secondary effect of telluric currents is that they attract airborne electrically charged particles of the opposite charge, which can have a significant effect on biology. The effects of breathing air ions have been shown in detailed studies. In modern buildings with enhanced crust permeability (such as faults), a decreased number of negative ions has been observed (Rudnik & Melnikov 2010), which can adversely affect human health, suppressing the immune system (Krueger 1972, Tchijevsky 1929).

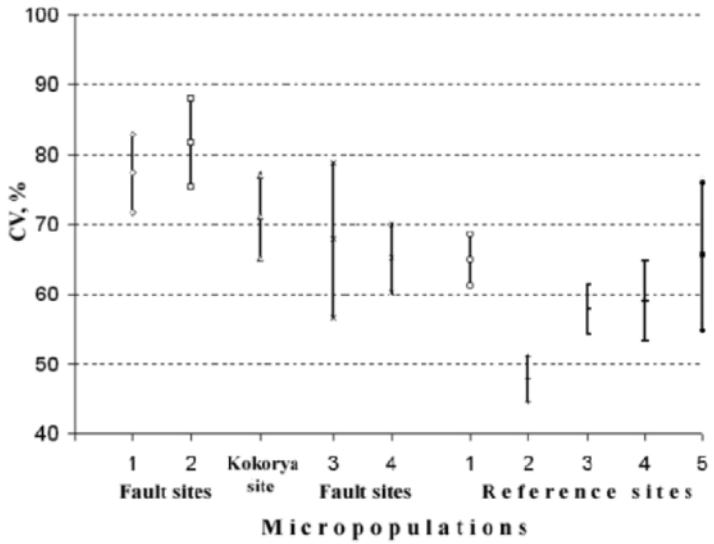

Figure 5. Variation (CV) of the fruit shape at a fault and at neutral sites (Boyarskikh & Shitov 2010).

Flora and Fauna

Obviously, the geopathic zones affect not only humans but also all species of animals, plants, fungi, and bacteria (Dubrov 2008, Gak & Gridin 2008, Hacker et al. 2008, Von Pohl 1983).

One ancient method for choosing a residence location was noticing the presence of shrubs, land color, presence of water systems, and tree growth. Also, another method used was housing animals in the proposed area and observing their behavior and health for a certain period of time (Bradna 2002). Thus it is obvious that the effect of earth radiation anomalies on plants and animals has been known for many thousands of years.

Tombarkiewicz (1996) in her research proved the effect of geomagnetic anomalies on cows' health. When they were moved to a location with anomalies, they developed health problems above a normally expected ratio, and also showed lower levels of zinc, copper, and iron.

Yeagley (1947) showed that pigeons have a magnetic sensation that allows them to use the geomagnetic field as a compass. Magnetic crystals have been found in almost all animals using the Earth's magnetic field for navigation (Long 1991). Regarding plants, Boyarskikh and Shitov (2010) showed that fruit plants located within geophysically anomalous areas produced smaller fruits and increased diversity of fruit (Figure 5), and an increase in the expression of recessive traits.

Plant intrapopulation variability increase occurs in the least favorable environments according to Mamaev (1973). Geophysical anomalies act as stress parameters for plants.

Conclusion

Various parameters constitute a geophysical anomaly. Among them are intense change in the magnetic and/or gravity field, change in radiation or radioactivity levels, conductivity discontinuity of the ground material, the presence of a fault, and/or subterranean water.

The effect of these anomalies on human health can be explained through the presence of magnetite, iron, water, and also the body's own electromagnetic fields (brain, heart, neural network). Adverse effects are also shown in flora and fauna.

Acknowledgments

Special thanks to IKY, the State Scholarship foundation in Greece, for financial support of this doctoral thesis research.

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