Nonlocal Correlations in Macroscopic Systems: Living Objects, Mental Influence and Physical Processes

Rafik Sargsyan and Gagik Karamyan

ABSTRACT

The paper presents the result of studies carried out with the help of device developed by us where the measured parameter is the intensity of scattered light inside closed casing. The device allows to non-invasively and remotely detecting signals from biological objects (plants, animals and human), as well as physical processes. From other side, the inanimate substances in environment temperature do not affect device's signals, except water. Also it is established that some persons with high extrasensory abilities (i.e. healers) can influence the signals form. It is shown that the variation of the device's readings depends on various factors, characterizing the experimental conditions, i.e. influence of observer and studied object. Particularly, it is shown that signals' changes characterize the physiological state of biological systems and the device can serve as a novel biomedical instrument. The analysis of the registered signals carried out by the software packages OriginPro and LabView has proved that observed effects are statistically reliable and always reproducible. It is found out that the nature of observed phenomena is not associated with known classical interaction channels. A concept that explains these effects, based on the quantum mechanical approach is proposed.

Key Words: biosensor**,** non-invasive detection, biological objects, light scattering, macroscopic quantum effects

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Introduction

From the point of view of classical physics, natural phenomena and processes do not depend on the individual observing them. The measurement of any quantity that characterizes the state of a macroscopic physical system does not depend on the experimenter. Here, the role of the experimenter is reduced to choosing the experimental conditions, as well as processing and interpretation of the results. Identical measuring instruments, anywhere, at any time and under the same environmental conditions should show the same results when measuring the same characteristics of an object taking into account the device's statistical errors. Based on this approach, standards for many physical measures (length, weight, time, etc.) have been established, were found out fundamental physical constants (speed of light, particles mass, etc.) and quantitative characteristics of materials (temperature, weight, size, etc.).

However, various researchers have registered some deviations from these relationships, as well as strange cosmophysical fluctuations and correlations, depending on the time of day or year for some processes (for

Corresponding author: Rafik Sargsyan, PhD, DS.
Address: L.A. Orbeli Institute of Physiology of NAS of Republic of Armenia. 22 Orbeli brots. Str., 0028 Yerevan, Armenia.
Phone: + 374 94 103 646
Fax: +374 10 272 247
e-mail ✉ rafsarg@yahoo.com and gagik_karam@yahoo.com
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example, the rate of chemical, biochemical and nuclear reactions) (Shnoll *et al*., 1998; Shnoll, 2012). Besides, it has been well established that some people may have a remote impact on different processes, i.e. to move objects, to change the direction of laser beam, to modify chemical properties of the substances, to influence the random events, etc. (Bryan, 2006; Vilenskaya and May, 1994; Yan et al., 2002; Mason, 2007). Also, there has been discoveries of amazing abilities of especially gifted operators to feel and recognize remotely the color of objects, read texts in a sealed envelope (Vilenskaya and May, 1994), to see through the human body, and even find sources of water and minerals deep underground without the use of modern sensors (Hansen, 1982). In these cases, the sensitivity shown by certain individuals was much higher than those of novel analytical instruments. Thus, there are many strange phenomena in the classical macroscopic world that are not considered and explained by standard science, being considered as pseudoscientific or erroneous.

The role of observer in experiment (the "measurement problem") has been widely discussed by many researchers since the emergence of quantum mechanics (especially by followers of Copenhagen school, Bohr, Heisenberg, von Neumann etc.). The problem arose in the study of subtle experiments related to disturbance of microscopic systems, when they were irradiated by photons, electrons, electromagnetic fields, etc. Because in the act of such exposure the so-called collapse of the wave function happens, the question arises whether the measured parameter is inherent in the system itself before experiment, or it is formed as a result of the disturbance induced by the measurement. On this basis one claimed, for example, that there is no reality outside the observation, or that observation "creates" reality (Wheeler, 1977). However, these declarations, if true, can be applicable only to the microcosm, for which the formalism of quantum mechanics was created. For example, experiments with microobjects showed that, depending on the experimental conditions defined by the observer, the electron may exhibit the properties of the particle or wave. Hence the conclusions about the special role of the observer's consciousness, the presence of mind in microparticles, etc. has arisen. Other researchers have held the opposite assessment, so Prigogine insisted on the necessity of exception of "subjective element associated with the observer" in quantum mechanics (Prigogine, 2000, p.50). Another renowned physicist, D. Bohm also believed that there is an objective reality and the world is made of ordinary objects whose properties do not depend on the observation (Bohm, 1952). Thus the question of the role of consciousness in quantum reality was the subject of a quasi-metaphysical philosophical debate and speculations.

Above we gave the examples of direct active influence of observer on macroscopic objects and processes, which, although are rejected by the majority of orthodox researchers for being pseudo-scientific, in our opinion are quite reliable, reproducible and proven in many laboratories around the world. In this respect, it is very important to have a device (physical apparatus), which could quantitatively and reproducibly register these phenomena.

In this paper we present some results of studies conducted in our laboratory for more than 20 years which are directly related to the considered problems.

Experimental Section

The main instrument by means of which the studies were carried out was the Bioscope device (Draayer *et al*., 2007; Sargsyan *et al*., 2010a; Sargsyan *et al*., 2010b; Sargsyan *et al*., 2011) created by us. The design and one of the modifications are shown in Figure 1.

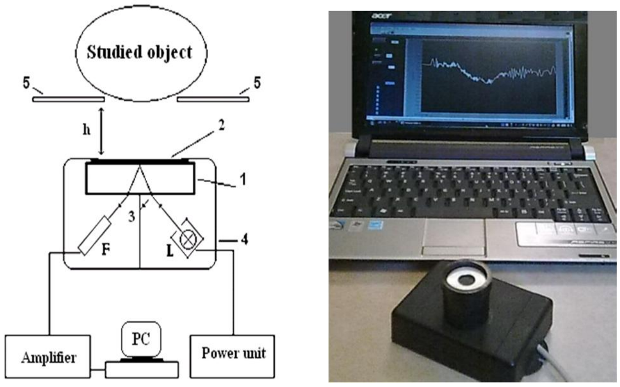

Figure 1. General sketch of Bioscope and its picture.

The light emitted by the incandescent lamp or laser (L) was reflected and scattered back from the glass plate (1) and covering opaque material (2) (black paper, thin plastics, iron or permalloy plate, etc.), whereupon it reached the photo-detector (F). The baffle (3) was installed for dividing two light beams. This system was inserted into light-tight metallic case (4). Investigated object was situated on the support (5) on a distance *h* of 1-5 cm over the opaque material (2).

It should be mentioned that no light comes out from the device case and enters into it. Photo-detector signals were amplified (up to about 500 times) and after analogue-digital transformation arrived to the computer. The power was supplied by an AA battery or from computer via USB port. Initial background level of photo-detector signals was 50 mV. Observations and calculations have shown that the deviation of amplitude of a registered signal from initial level was already no more than 0.1 percent, i.e. statistically reliable at significance value of $p<0.001$. The analysis of the registered signals was carried out by the software packages OriginPro and LabView.

In initial experiments we found an ability of biological objects to effect non-invasively on the character of light scattering in an isolated chamber (4). The typical examples illustrating the signal changes are presented in Figure 2. When incandescent lamp or LED was used as a non-coherent light source (L), the device readings represented smooth curves which were raised or descended relative to the control line (I). In the case of laser (II, coherent light source), signal oscillations appeared which frequency and form were dependent on the nature of studied object. Oscillations frequency decreased with increasing distance from Bioscope.

It has been proven that external electromagnetic or acoustic fields do not affect the device background signal within the limits of experimental error. As regards to the nature of signals arising due to the influence of object on the device, numerous control experiments have allowed to conclude that none of the classical interactions can be the cause of such effects. The observed phenomena were reliable and permanently reproducible.

As can be seen from Figure 2, among different biological systems the strongest is the human impact. This is reflected in the height of signal deflection in comparison with control level.

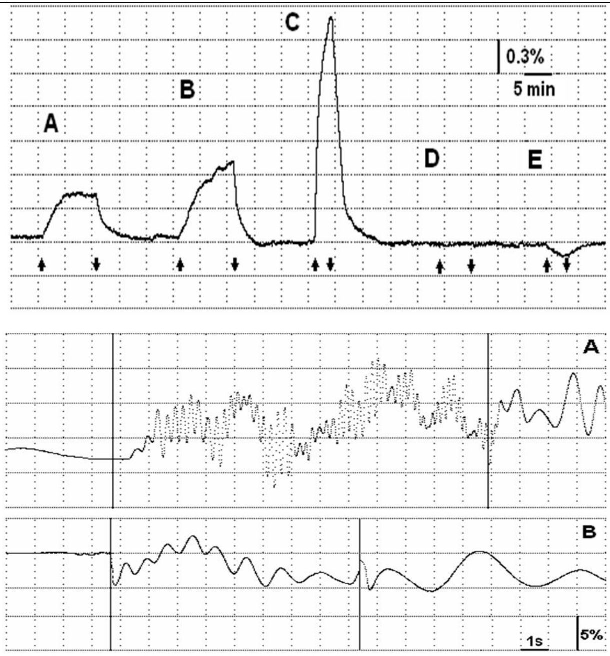

Figure 2. Some basic effects with incandescent lamp (upper) and laser (below) as a light source. (Upper – non-coherent light) A – apple, B – grapefruit, C – human palm, D – aluminum plate at ambient temperature, E – same plate heated to 40 ^{0}C. Arrows indicate approaching and removal of the objects relative to Bioscope. (below – coherent light) A – human palm, oscillation frequencies up to 10 - 15 Hz. B – apple, oscillation frequencies up to 1Hz. Vertical lines correspond to approaching and removal of biological object relative to Bioscope.

Figure 3A shows that in the empty lab the Bioscope's signals (with laser light source) present statistically significant non-regular oscillations. These oscillations are observed even if Bioscope is located in the lead container or in vacuum chamber (at 10^{-5} torr). It is interesting that in empty room an explicit correlation was revealed between the changes of amplitude-frequency characteristics of the background Bioscope's signals with the moments of sunrise and sunset.

Figure 3B and C illustrates the Bioscope's signals which indicate that experimenter's arrival at laboratory in the morning changes general background readings of Bioscope and vice versa, after his departure from the laboratory, device's readings come back to the initial level. This is purely the effect of presence and it depends on the specific person or his emotional state. We believe that a purely biological (vegetative) factor takes place here, as a manifestation of the vital functions of the body. The same influence, but to a lesser extent, is produced by plants or animals. So here we see the direct influence of the observer on the device, more precisely, on the scattering of light in the device's sensor. In fact, in this case the device is the studied object.

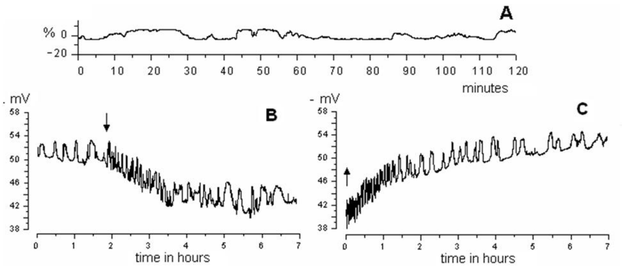

Figure 3. Influence of experimenter (observer) on the Bioscope's signals. A - control (noise) signal in empty room (bellow 0.1 osc/min), B - in presence of observer in the room (about 0.2 osc/min, distance is 2-3 m from Bioscope), C - after observer's departure from the experimental room. Arrows show the moments of entering (B) and leaving (C) the room.

In the presence of several people in the laboratory, the background readings vary greatly. Note that human influence on the devices is not new. The well-known anecdotal "Pauli effect" may be recalled, whose presence in the laboratory led to the disturbance of the devices' operations and even their failure. In our case, the emotional and psychological impact of human on the device is obviously detected. Subsequent experiments showed that the presence of experimenter also affects indirectly the photodetector's signals during remote registration of physiological state of rats (both awake and anesthetized) using Bioscope. In this case, the interaction *observer* $\rightarrow$ *device* and *observer* $\rightarrow$ *object* is registered. Solely for the reason of eliminating the experimenter's influence, all experiments with laboratory animals were conducted in special remote laboratories, and all procedures were performed remotely from a computer installed in a central laboratory. But this changes the conventional methodology of conducting experiments in physics, chemistry and biology, and requires preventing the presence of experimenter near the instrument and the studied object (at least in our experiments).

A series of experiments were carried out by means of Bioscope for investigating the effect of injecting rats with various medical drugs, as well as studying the impact of mechanical and acoustic stress on them (Figure 4).

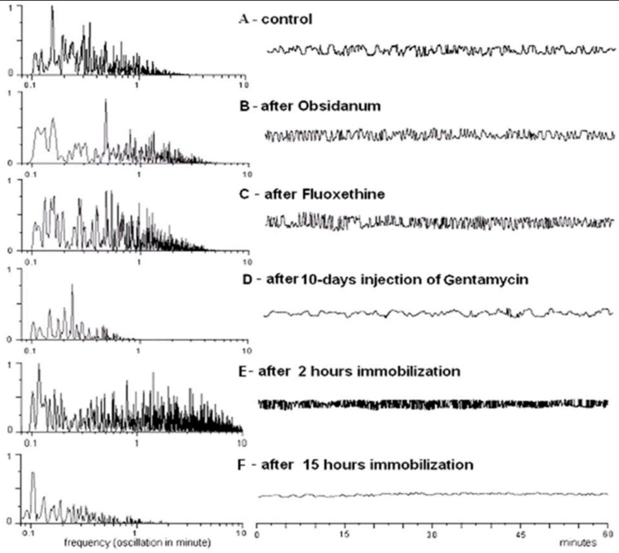

Figure 4. Influence of some pharmacological preparations and immobilization stress on the signals of Bioscope for anesthetized rats. Relative scale shown on the vertical axis is identical for all corresponding curves. The sensor of the Bioscope is located at a distance of 1 cm from the back of rat.

Figure 4 shows that the experimental data obtained non-invasively is changed dramatically depending on the type of administered medication and the character of the stress. Comparison of data obtained using Bioscope and standard electrophysiological techniques demonstrates that a reliable correlation and concurrence are observed at analysis of the neurophysiological parameters of laboratory animals (rats, mice), and in some instances Bioscope provides more adequate characterization of the physiological state of animals. Thus Bioscope can serve as a new method of assessing the physiological status of laboratory animals and be used as a new spectroscopic tool. For example, we have discovered the specific frequency signal ("cancerous peak") of mice (*In press*) already on the first day after infecting those with skin cancer. In terms of bioethics, we should note the importance and advantage of using the Bioscope compared with traditional physiological experiments on animals associated with painful operations of implanting electrodes, cutting tissues, organs, etc. Studies using Bioscope do not have any physical or emotional impact on animals or people.

Besides experiments on animals, we have conducted studies related to influence of human physiological, psycho-emotional and mental state on the Bioscope's signals. For example, we conducted studies of the state of volunteer-students before and after physical exercise on a gym apparatus, before and after activation of acupuncture points, and after activation by homeopathic remedies (Sargsyan *et al.*, 2010a). All these effects are reflected in changes of the frequency and waveform of Bioscope's signals. These data are irrefutable evidence of remote interaction *human* $\rightarrow$ *device* depending on the physiological and emotional state of the person.

Another important effect of the interaction with Bioscope device has been discovered in experiments where a psychic (extrasensory individual) influenced the physiological state of patient (trying to cure it), and the device has remotely checked the state of the latter (Figure 5). The interaction scheme is: *observer* $\rightarrow$ *object (patient)* $\rightarrow$ *device*. As can be seen from the Figure 5, over some time after cessation of treatment process the patient's signals are dramatically changed and point the improvement of patient's overall state.

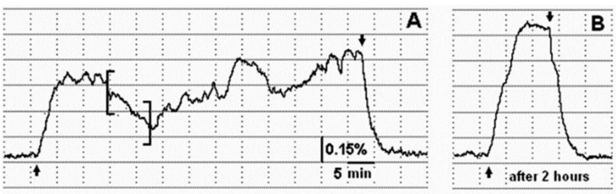

Figure 5. Extrasensory correction of ill patient state. A – Bioscope readings in the healing process. B – Bioscope readings after two hours. Arrows indicate approaching/ removal of human palm to/from Bioscope. Square brackets correspond to healing time.

It should be noted that during the extrasensory influence the state of patient at first is worsening, which is accompanied with reducing signal height. However after termination of the influence the signal level begins to increase and 2 hours later (Figure 5B) signal level is raised by 1.5 times as compared with initial value.

For exclusion of the possible role of psycho-emotional or mental state of the patient, an analogous experiment has been carried out on anesthetized rats. It has been found that the character of influence of extrasensory individual on the rats is similar to the trials on human.

Figure 6 shows the results of an experiment on conscious (mental concentration) human influence on the Bioscope device placed at a distance of 10 m in another laboratory, protected by two concrete walls. As can be seen, the reaction of the device's signals on the mental influence begins with a delay of 10 minutes and continues for 20 minutes thereafter. This fact can be interpreted as slow "speed" of the mental impact which depends on a distance and barriers (two concrete walls). As can be seen in the Figure 6, the device has a "memory", and its readings are slowly returning to their original values after cessation of influence. Thus Bioscope reliably registers active (suggestive) human influence. In other words, the person affects the scattered light (redistribute it) inside the device. This phenomenon is similar to observation of Radin with coauthors (Radin *et al.*, 2013) where a group of people perturb the interference pattern of double-slit system concentrating mental attention toward apparatus. It is worth to mention that Bioscope can be used as a sensor for various parapsychological experiments to assess the faculties of healers and exercise their powers, as well as be used for lie detectors and other purposes. In this case, the subject of the impact is the device itself (the interaction *object (person)* $\rightarrow$ *device*). From a methodological point of view, it is important here that the motivated experimenter can mentally distort the experimental results in different ways, if he wants to get the desired result, for example, to confirm his theory. Hence the important conclusion is that the observer during the experiment should take a psychologically neutral stand, or the experiment should perform another person who does not know what result is positive or negative (double blind experiment).

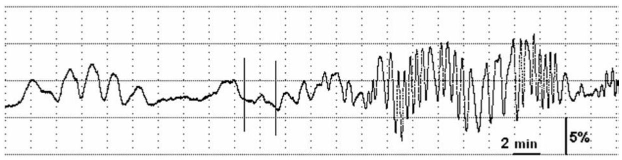

Figure 6. Mental influence of the observer on the Bioscope's readings. Segment between vertical lines indicates the duration of the observer's mental influence.

An interesting fact was discovered when Bioscope was used for testing the ability of children with intellectual disabilities to realize a question or make any decision. It has been found out that device clearly reacts to the moment of awareness. This opens up other possibilities of using Bioscope in neuropsychiatric or rehabilitation centers.

In another series of experiments it has been found that not only biological systems induce the changes of Bioscope readings, but similar phenomena are observed, when the sources of "strange" radiation were irreversible physical and chemical processes that occurred near the device. As such sources were used the processes of ice melting, salt dissolution, evaporation of liquids, etc. The Bioscope clearly registered these processes which manifested in abrupt changes of the form, amplitude and frequency of signals (Sargsyan *et al.*, 2010b). At the same time the processes associated with increasing thermodynamic entropy, as well as warm objects, have led to the deviation of Bioscope's signals in one direction, whereas biological systems and cold objects - in the opposite direction. These regularities are consistent with the entropy concept of directivity of signal variation because bio-objects and cold bodies have a more ordered structure and, hence, a lower entropy.

It was also discovered that dynamic physical processes occurring in vicinity of Bioscope such as motor rotation, rotation of light in the fiber coil, rotation of water in the tube coil also lead to a change in readings (in direction characteristic to reducing the entropy), and these effects were again delayed by 5 - 10 minutes and continued for a long time after cessation of the rotation (Sargsyan *et al.*, 2010b). It has been found out that even some inanimate objects in the form of a pyramid and cellular structures also influence the Bioscope's signals. Interestingly, among all inanimate objects only water (even in a closed ampoule) produces signals comparable to those of biological objects (Sargsyan *et al.*, 2010a). This allows considering water as a "living" object, which, incidentally, is not unexpected, because many researchers have been noting for a long time the anomalous properties and behavior of water and aqueous solutions.

Subsequently, we have shown that the above patterns are observed not only in the Bioscope, but also in other apparatus where the laser beam is scattered in the diffraction slit (Sargsyan *et al.*, 2010b). And in this case, the presence of biological objects and physical-chemical processes occurring near the apparatus caused displacement and redistribution of intensities of diffraction pattern on the screen (Figure 7).

This experiment confirms the data obtained by the Bioscope, and supports the hypothesis that just the scattered light is the sensible substance, which allows to identify described effects.

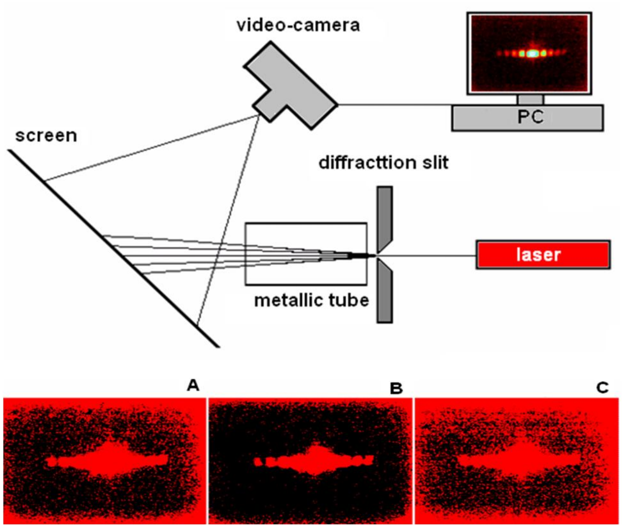

Figure 7. Diffraction experiment illustrating the change of randomization level of scattered light. A – control picture of a diffraction slit, B – at approaching of biological object to the metallic tube, C – at approaching of heated article to the tube.

All of this suggests that the biological objects and physical-chemical processes are interrelated in their action on the device. In this connection, a particularly interesting fact has been found in the study of signals from inanimate objects. At room temperature, most of the materials (metals, dielectrics, etc.) in a static (equilibrium) state do not change the Bioscope's readings. However, a piece of paper or some other object, which was held in the hands of the experimenter within half a minute and then placed near Bioscope, caused the same signals as the experimenter's hand (Sargsyan *et al.*, 2010a). The signals of "charged" piece of paper continued for several minutes and then damped. This effect of "*biologization*" (animation) is one of the most striking in our experiments and it specifies the deep interconnection between the animate and inanimate objects and can be represented by the interaction scheme *observer* $\rightarrow$ *object* $\rightarrow$ *device*.

Results and Discussion

All these experiments indicate that we are seeing an unknown non-energy interaction channel, and the recorded effects are associated with the deviation of direction of scattered light rays inside the device, i.e. with the change of their phase. We can assume that biological systems are surrounded by a certain phase medium – "aura" (Sargsyan *et al.*, 2010c), and at approaching to the Bioscope's sensor this medium penetrates into the device and redistributes the flow of scattered light by ordering it. Importantly, in experiments with Bioscope, as well as with diffraction slit, we are dealing with a scattered light that is extremely chaotic and non-equilibrium system as compared with an incident light (coherent laser radiation), and therefore the scattered light is very susceptible to external influences, such as the action of "aura" of biological objects. At the same time, the scattered light becomes something organized, which leads to a change of Bioscope's signals. This is clearly seen in Figure 7, which shows the change in contrast of diffraction slit image under action of bio-object and heated inanimate object.

This effect resembles the action of a glass lens, but in the first case for a biological object this is a convex converging lens, whereas in the second case, for the heated object, it is a concave diverging lens. As known in optics, the lens is a phase object, which does not change the overall intensity of the light but changes the direction of rays. Thus, we have assumed that mentioned "aura" or "hallo" around macroscopic systems represents a phase substance that is expanded and penetrates into the Bioscope, when any characteristic of the studied object (in non-equilibrium state) is sharply changed.

Before proceeding to identification of the nature of observed phenomena, it is worth to note that the orthodox biology is based on the concepts of classical physics and chemistry, and biological activity of living systems and all vital processes are reduced to complex biochemical intermolecular interactions. However, classical concepts could not explain many phenomena observed in living organisms, especially human consciousness. With the emergence of quantum physics, new views on biological systems were aroused. Although all described experiments presented by us have concerned to macroscopic systems, and it is assumed that quantum mechanics describes mainly microscopic systems and phenomena, the biological systems manifest properties inherent to quantum systems. This was partly due to the fact that in occurring phenomena the similarities with nonlocal collective interactions were observed. We think that quantum mechanics is valid also for macroscopic objects, particularly for biological systems. Such opinion is shared by many scientists (Tarlaci, 2011).

Here are quotes by famous creators of quantum theory on the relationship between biology and quantum physics:

> "The behaviour of living organisms partly is similar to that of systems near absolute zero temperature, when molecular disorder is removed" (Schrödinger, 1944).

> "The specific heat at very low temperatures for the first time has demonstrated quantization on a macroscopic scale (i.e., superfluidity). Macro-concepts are always "collective" properties. Due to thermal disorder, the phase differences between pure quantum states average out, but due to non-linear interaction, phase correlations over macroscopic regions are possible, resulting in a macroscopic wave function, which persists after the appropriate thermal averaging has been performed. The macroscopic wave function depends on space, time and a few parameters" (Fröhlich, 1969).

> "Quantum mechanics seems to be valid also in the macroscopic domain, notably in the field of biology" (Primas, 1979).

> "The successful application of quantum mechanical concepts to the description of macroscopic systems, as in superfluidity, shows that an object's small size is not a criterion for the application of quantum mechanics. Basic principles of quantum mechanics, such as the quantum ladder-structure of energy and the existence of characteristic *eigenfrequencies* are applicable to living organisms when functioning as a whole is considered" (Sitko, 1991).

Fundamental to all these approaches is the *"macroscopic wave function"* (MWF), a concept which has received a rigorous foundation in the quantum theory of collective phenomena (Sewell, 1986; Preparata, 1995).

We think that the concept of MWF may be useful for description of biological systems, as well as of inanimate matter possessing collective (coherent) properties, such as superconductors, lasers, ferro- and anti-ferromagnets that are considered as macroscopic quantum systems. Many of the chemical and physical processes can be also seen as having a collective behavior and exhibiting general macroscopic wavefunction. Among them are phase transitions, periodic chemical reactions (e.g., the Belousov-Zhabotinsky reaction), in which a huge number of atoms and molecules simultaneously and coherently participate in the transformation process, the discussed above motor rotation and other phenomena, wherein all the structural units rotate at the same angular velocity.

Thus, the collective effects in macroscopic objects and processes require a generalization of quantum mechanics, which can be fundamentally different from the quantum theory of atoms and molecules.

Theoretical Interpretation

In an attempt to interpret the nature of detected nonlocal interactions, and bearing in mind that the act of light scattering is a quantum mechanical process, we have tried to do it in the framework of quantum mechanics, following to Bohm's approach. It is based on the expression of the Schrödinger wave function

$$i\hbar\frac{\partial\Psi}{\partial t} = -\nabla\frac{\hbar^2}{2m}\Psi + U\Psi$$

in polar coordinates:

$$\Psi = Rexp(iS/\hbar) \qquad \textbf{(1)}$$

were R (amplitude) and S (phase) are real functions of coordinates and time. Then the general equation of quantum mechanics for any system of interacting particles can be written in the mathematically equivalent form of two equations:

$$\partial P/dt + \sum_i (\nabla_i S)^2/2m_i + U + Q = 0 \qquad \textbf{(2)}$$

$$\partial P/dt + \sum_i \nabla(P\nabla_i S/m_i) = 0 \qquad \textbf{(3)}$$

For macroscopic system the phase S acquires a meaning of action, U is classical and Q is quantum potentials. ∇^2 and ∇ are Laplace and nabla operators, m_i denotes the mass of i-th particle and $\hbar$ is the Plank's constant. $R^2 = P = \Psi\Psi^*$ is the probability density of realization of system state. The equation (2) is classical Hamilton-Jacobi equation with extra quantum potential $Q = \sum_i Q_i$ where

$$Q_i = -(\hbar^2/2m_i)(\nabla_i{}^2 R/R) \qquad \textbf{(4)}$$

is the quantum potential acting on i-th particle.

The equation (3) is the continuity equation which shows that the probability density is moved according to lows of classical mechanics with the speed $\nabla_i S/m_i$ for each i-th particle. Due to extremely low value of $\hbar^2/2m$ it has been concluded that the influence of quantum potential can be neglected (Landau and Lifshitz, 1977) and subsequent analysis of its role in macroscopic phenomena was not conducted.

We propose that for macroscopic system the statistical probability, $P\sim exp(\mathcal{E}/k)$ where $\mathcal{E}$ is the system entropy and k is the Boltzmann constant (Landau and Lifshitz, 1969), is identical to the quantum mechanical probability, $P = \Psi\Psi^*$, and whence $R\sim \exp(\mathcal{E}/2k)$. Therefore, after corresponding substitution, the system's wave function Φ will be determined by the values of its entropy and action

$$\Phi = \Phi(\mathcal{E}, S)\sim exp(\mathcal{E}/2k + iS/\hbar) \qquad \textbf{(5)}$$

whereas the quantum potential of macroscopic system can be rewritten as

$$Q = (\hbar^2/2M)[{}^1/_2(\nabla^2\mathcal{E}/2k) + {}^1/_4(\nabla\mathcal{E}/k)^2] \qquad \textbf{(6)}$$

Let us consider the system consisting of two non-interacting macroscopic subsystems. Their wave functions can be written as $\Phi_1 = \Phi_1(\mathcal{E}_1, S_1)$ and $\Phi_2 = \Phi_2(\mathcal{E}_2, S_2)$. Entropy and action are additive characteristics of the system therefore for the full system one can write $\mathcal{E}_{1+2} = \mathcal{E}_1 + \mathcal{E}_2$ and $S_{1+2} = S_1 + S_2$. Taking into account the equations (1) and (2) after simple transformations we obtain the following expressions:

$$\nabla^2\mathcal{E}_1/M_1{}^2 + \nabla^2\mathcal{E}_2/M_2{}^2 = (-1/2k)[\nabla\mathcal{E}_1/M_1 - \nabla\mathcal{E}_2/M_2]^2 + (2k/\hbar^2)[\nabla S_1/M_1 - \nabla S_2/M_2]^2 \qquad \textbf{(7)}$$

$$\nabla^2 S_1/M_1{}^2 + \nabla^2 S_2/M_2{}^2 = (-1/k)[\nabla\mathcal{E}_1/M_1 - \nabla\mathcal{E}_2/M_2][\nabla S_1/M_1 - \nabla S_2/M_2] \qquad \textbf{(8)}$$

where M_1 and M_2 are the masses of subsystems, while $\nabla S_1/M_1$ and $\nabla S_2/M_2$ are the average velocities of subsystems' motion.

Thus, if at the transition to macroscopic description to consider all terms in the systems of initial Schrödinger equation (2) and (3), and using the expression known in statistic physics which connect the probability of realization of macroscopic state of the system with its entropy, one can conclude that even in absence of potential interactions between two macroscopic subsystems, their entropies ($\mathcal{E}_1$ and $\mathcal{E}_2$) and actions (S_1 and S_2) are in the certain functional relationship which is determined by the equations (4) and (5). These equations do not contain the time therefore any change of entropy ore action of one subsystem should lead the instant change of these characteristics of another subsystem. Above considerations were made completely arbitrary and as a whole system we can select the physical world around. For a small separate subsystem the rest of the world can be considered as a second subsystem. Taking into account that the mass of separate subsystem is much smaller than the mass of outward world, for entropy and action of small subsystem one can write

$$\nabla^2\mathcal{E} = \mathcal{X}, \text{ where } \mathcal{X} = (-1/2k)[\nabla\mathcal{E}]^2 + (2k/\hbar^2)[\nabla S]^2 \quad \textbf{(9)}$$

$$\nabla^2 S = \mathcal{Y}, \text{ where } \mathcal{Y} = (-1/k)[\nabla\mathcal{E}][\nabla S] \quad \textbf{(10)}$$

Even in the condition of thermodynamic equilibrium with surrounding medium, as known in classic statistic physics, all parameters characterizing the macroscopic system are subjected to random fluctuations therefore the values of $\mathcal{X}$ and $\mathcal{Y}$ are always different from zero, and entropy and action of separate system satisfy the Poisson equation. If to take, as a first approximation, that the values of $\mathcal{X}$ and $\mathcal{Y}$ remain constant on the some level, than corresponding solutions of Poisson equations will have the form $\mathcal{E} \sim \mathcal{X}/r$ and $S \sim \mathcal{Y}/r$, where r is the distance from subsystem, and its wave function will be the following

$$\Phi = \Phi(\mathcal{E}, S) \sim (1/N)exp(\mathcal{X}/2kr + i\mathcal{Y}/\hbar r) \quad \textbf{(11)}$$

where N is the normalization factor. When r is increased, $\mathcal{X}/2kr \to 0$ and $\mathcal{Y}/\hbar r \to 0$, therefore in the space around any macroscopic system a spherical Φ field is formed with attenuated amplitude and spatial oscillations. Potential interactions acting in the separate system can lead to the change of $\mathcal{E}$ and S that will result in the immediately change of Φ field configuration.

Now we will consider two independent macroscopic systems. Around them the fields Φ_1 and Φ_2 are formed. If Φ_1 and Φ_2 are spatially not overlapped, the behavior of one subsystem is not dependent on other. But when Φ_1 spatially overlap the region of second, a new situation arises which is unusual for classic physics. The first subsystem can affect the state of second one. Actually, there are not potential interactions between subsystems, therefore the MWF of full system can be factorized and in the region of second subsystem it has a form $\Phi_1\Phi_2$, and this means that their entropy and action are changed. Since the entropy and action are functionally dependent on parameters characterizing the second subsystem, these parameters also are changed. In particular, at the distances between subsystems when the MWF of first subsystem has a form $\Phi \sim exp(i\theta_1)$ where $\theta_1 = (\mathcal{Y}_1/\hbar r)$, its influence on the second subsystem, by its nature, is similar to the effect of known phase object. Changing the MWF of second subsystem means that its entropy and action also vary, as well as quantum potentials acting on its particles. The values of entropy and action are in certain functional dependence on the parameters characterizing the second subsystem therefore, the values of these parameters are also changing.

The MWF concept explains mysterious, from the classical physics viewpoint, an experimental fact in regard of correlation between behavior of Bioscope signals and entropy change in studied objects, as well as formation of oscillations. Considering the first subsystem as a biological system or process, and the second one as a scattered light in the Bioscope, the mechanism of observed interaction (change of signals) can be explained by the alteration of entropy and action of scattered light inside Bioscope when bio-object is approached to the device. This leads to the redistribution of photons' directions which is expressed as a change of photocurrent in the photo-detector. In the design of Bioscope the coating opaque material is located at some distance from the glass plate. The MWF of studied system depends on this distance, therefore it will differently affect the phase of light scattered from the coating material and reflected from the glass plate. When using the laser as a light source, the interference of both these beams leads to pronounced intensity oscillations.

The experiments show that the MWF of bio-object or process can excite the device in such a level that after termination of the object's "action" we observe the continuation of signal for a long time. This is a "memory" effect which lasts until the system (device) comes back to its initial state. The same explanation can be proposed for the "*biologization*" effect when the unanimated piece of paper is "charged" by the MWF of the person. In similar way one can explain all phenomena described in this paper.

Conclusions and Outlook

So, we have elaborated a device which allows to detect the non-invasive remote signals of biological objects and some physical chemical processes. We have shown that the nature of these signals cannot be explained by classical electromagnetic effects, and are based on quantum mechanical interactions. Moreover, we have found out that the character of these signals reflects the features of physiological state of organisms, and the device can be used as a novel biomedical instrument for assessment of influence of various factors on the animal and human.

In addition, we have obtained the evidence that the inanimate objects subjected to dynamic processes or thermodynamic transformation also cause unusual distant signals detected by the Bioscope.

Important is our finding that experimenter should prevent the presence of himself/herself and other people in vicinity of device and observed object (at least for our sensitive device).

Consistency of empirical picture in all observed phenomena obtained using Bioscope with the results of theoretical analysis shows that the experimentally identified remote influences of biological systems, various thermodynamic processes and rotation processes are realized through the MWF. The latter is the very hypothetical optically active phase substance, which was introduced to explain the observed phenomena, and Bioscope acts as a measuring complex, which directly implements the registration thereof.

According to classical concepts, the background readings of Bioscope should show only noise fluctuations of device's electronic components. However, as it is observed in experiments even in vacuum chamber in the signals of Bioscope the statistically significant irregular fluctuations are generated. This fact indicates the existence in the physical space of unrecoverable "background" MWF unrelated directly with the objects surrounding the Bioscope. In conformity with Bohm's interpretation of quantum mechanics the "background" MWF should also lead to the formation in physical space a "background" quantum potential Q. In this connection it would be interesting to try its identification with puzzling cosmological dark energy, the nature of which, until recently, remains unknown.

Returning to the issues raised in this article, we recall that the experiments carried out in standard quantum mechanics are transient and are associated with an abrupt change (collapse) of the system wavefunction in the act of interaction with perturbing agent (photon, elementary particle, electromagnetic field, etc.). In contrast, the characteristic feature of our presented experiments is a long, continuous, dynamic process of observation and smooth character of changes in the device's signals. Perhaps this is the reason of unique ability of Bioscope to detect nonlocal macroscopic interaction. We can assume that during observation the originally independent and remotely separated macroscopic "participants" of experiment - *observer*, *device* and *object* gradually form a collective system, and their wavefunctions get combined (entangled in three-dimensional space) transforming into an integral macroscopic wavefunction. We have revealed the interconnections and mutual influences by the schemes: *observer* $\rightarrow$ *device*, *observer* $\rightarrow$ *object*, *object* $\rightarrow$ *device* and their combinations.

In the forthcoming papers we hope to continue researches aimed at collection of a database related to correspondence between character of device's signals and specific status of organisms, both of animals and human. Besides, we intend to work on the theoretical basis of observed phenomena and further advancement of quantum mechanics capable to consider the macroscopic objects.

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