Parapsychology and Contemporary Science

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CHAPTER 7

COMMUNICATION BETWEEN MAN AND PLANTS

Our experiments on communication between man and plants had numerous predecessors. A great Indian scholar, Jagadis Chandra Bose, discovered many hitherto unknown processes in plants. Soviet biologists, including Gunar Karmanov, and many others, demonstrated that electrical processes in plants have much in common with electrical processes in animals and man. Three researchers from Siberia, Kaznacheev, Shurin, and Mikhailova, discovered that cells placed in separate test tubes can communicate and that there is "empathy" between living cells; an adverse treatment of one cell culture had a similar effect on the cells of the other culture.

In view of this information, the extraordinary findings by an American researcher, Backster, presented by Tompkins and Bird in their book, "The Secret Life of Plants," no longer seem so incredible. Backster, a criminologist and a specialist in lie detection, had the unusual idea of connecting a house plant to his lie detector to see if the plant would respond with a galvanic skin reflex (GSR) to the death of a living organism nearby. Backster reasoned that, should the plant respond, we would have a new crime-fighting weapon; plants could be used as crime witnesses.

The experiment, designed to test the effects of the most serious crime, murder, was arranged as follows. Live brine shrimps were placed on a small dish over a pot of boiling water. A control mechanism would automatically turn the dish over at randomly selected moments; the experimenter did not know in advance when the dish would turn over. When the dish flipped, the shrimps were thrown into the boiling water and died. The timing of this event was recorded on the paper tape of the GSR recorder.

This experiment showed that the leaves of a house plant responded to the death of nearby brine shrimps with a GRS similar to that of a human being.

Backster's experiment sent shock waves throughout not only the academic community, but the whole world. It is not hard to see why. A plant is a system of living cells which does not have a neural control network. A shrimp is an animal with a nervous system, however primitive. And these two living organisms, on two different levels of biological development, turn out to be capable of "understanding" each other and of communicating in some common language.

Even more impressive was Backster's discovery of communication between man and plants. His experiments have shown that the processes in the human brain which lead to a GSR in man evoke a similar response in a plant. In other words, processes in the most developed brain evoke a GSR in a living organism, which does not have a brain or even any elements of a nervous system, whatsoever.

Acting on the news of Backster's experiments, scientists from all over the world made attempts to investigate man-plant communication. However, the results of these experiments were not clear or conclusive. Some laboratories reported that they had successfully repeated Backster's experiments and confirmed his basic findings. Others reported negative results. In some publications, it has been reported that even Backster himself has been unable to obtain the same experimental results on a consistent basis; he has not always been able to establish communication between the same person and the same plant.

Thus the problem of man-plant communication remained unclear. On one hand, the Backster effect seemed to have been demonstrated in many cases; on the other, it was not one hundred percent replicable. Obviously, what was called for was a break-through in technique which would increase the reliability of this strange form of communication.

This was the situation when we, Pushkin, Fetisov, and Angushev, started our pilot psycho-botanical research. In our experiments, we used a GSR technique somewhat different from Backster's. Backster used the Feré effect to record GSR; he measured the decrease in the electrical resistance of the plant's surface area. In contrast, we used the Tarkhanov effect to record GSR; we recorded the electrical current which the plant generated on an electroencephalograph.

Our first attempts to record communication between man and plants failed. Because of these failures, we decided to use hypnosis to control the mental processes of our subjects. We

reasoned that fairly strong emotional states were needed in a person to evoke a response in a plant. It was not always possible to create such emotional states under normal conditions. Hypnosis can alleviate these difficulties to a large extent. A good hypnotist can induce in his subject a variety of mental experiences, some of them quite intense. In this way, the hypnotist can precisely regulate the psychoenergetic response which is associated with the subject's emotional state. We found out that it was necessary to hypnotically control the mental states of our subjects in order to establish consistent communication between our subjects and the plants. In fact, we think that a lack of control of psychoenergetics caused the failure of some of Backster's experiments and prevented some other scientists from duplicating his results.

We have learned that not only the state of the subject, but also the state of the plant, is essential for a successful experiment. As many experiments have established, the plant displays spontaneous irregular electrical activity immediately after electrodes are attached to one of its leaves. It takes some time for this activity to stop and for the electroencephalograph to start recording a straight base line, which is necessary in order to begin each experiment.

In our experiments, we noticed that far from all the subjects were capable of establishing communication with plants. Apparently, these differences were due to individual differences in the psychoenergetic systems in our subjects. Highly temperamental and emotionally open female college students (that is, those who responded quickly with strong emotions) were most effective in evoking responses from plants. However, once a subject established communication with a single plant, she was able to communicate with other plants easily and consistently.

To illustrate our procedure, we will describe our experiment with a female student, Tatiana. Before the experiment began, the subject made herself comfortable in an easy chair, in a position suitable for hypnosis. She was sitting at a distance of approximately one meter from the plant, which was on a table. After Tatiana had been hypnotized, she was made to identify with the plant. The hypnotist would say: "You are not Tatiana any more. You are a flower, the flower here on the table in the lab." The experiment began only after Tatiana, deeply hypnotized, confirmed that she was the flower.

First, we tried to establish if communication between our subject and the plant was one effect of hypnotically inducing emotional states in the subject. Thus, the subject was told that she (i.e., the flower) was very pretty and that children in the park liked her. Tatiana's face lightened with a happy smile. She was clearly enjoying the hypnotically suggested attention. At the

very same moment when Tatiana was experiencing this positive emotion, the first response from the plant was recorded.

To see if a negative emotion would have a different effect, it was immediately induced in our subject. The hypnotist told Tatiana that the weather had suddenly changed, the temperature had dropped drastically, cold wind and heavy snow had started, and that the poor flower, out there in the open, was quite miserable. Tatiana's face changed dramatically. Now she looked unhappy and started shivering like a person in light clothes out in the cold. The flower promptly responded.

After these two successful experiments, we took a break. During the break, the paper tape of the electroencephalograph kept moving, and for all 15 minutes of the break, while the subject was emotionally quiet, the pen kept marking a straight base line: no response from the flower.

After the break was over, the hypnotist started again by describing the cold wind and freezing temperature. Now he added an evil man who was approaching our flower-subject with ominous intentions. The suggestion had an instant effect: Tatiana's face again showed a strong negative emotion. The plant immediately responded with a large change in electrical potential; the pen recorded a typical GSR wave.

After this negative suggestion, the hypnotist switched back to positive emotions. He told Tatiana that the cold wind had stopped, the sun was shining again, and all the plants — flower-Tatiana included — felt warm and good. And instead of the evil man, a smiling toddler came close to Tatiana, and the toddler liked her. Tatiana's face changed again: the expression of discomfort due to the cold wind was replaced by a happy smile. The plant responded again with a distinct GSR wave.

Next, at random intervals, we signalled the hypnotist to induce positive or negative emotions in Tatiana. The plant always responded to the changes in Tatiana's emotional state; we could evoke GSR in the plant as many times as we wanted and at exactly the times we wanted.

To test our experiments, we invited other scientists, known for their scepticism, and asked them to try to find a flaw in our experiments. We asked them to show that there really was no connection between the changes in the mental states of our subject and the GSR of the plant — that the plant was actually responding to some external factors.

During breaks between experiments, the sceptics turned on the electroencephalograph to which the electrodes attached to the plant

were connected. The electroencephalograph was left on for hours and no GSR was recorded; in contrast, during the experiments, GSR could be recorded many times a minute.

Still, it was possible that something somewhere nearby generated electrical charges in the air which the electroencephalograph might have recroded. To eliminate this possibility, the electrodes from the unused channels of the electroencephalograph were hung free in midair or attached to various objects. Of course, the experiments with these safeguards were done by the sceptics themselves; they placed the electrodes, they recorded the responses, they gave signals to the hypnotist who, on their command, changed the mental state of the subjects.

In all the control experiments, nothing similar to a GSR — and in fact nothing at all — was ever recorded during the breaks or in the additional channels. At the same time, the electrodes affixed to the plant recorded a GSR wave whenever the subject's mental state changed. These findings justify the conclusion that a GSR in a plant is, indeed, associated with a subject's hypnotically-induced emotional state.

As all these control measures show, we were fully aware of the unusual character of our psycho-botanical experiments. From the very beginning, we used every experimental control possible to eliminate any external factors which conceivably could affect the recordings. Ours was no ordinary psychological experiment.

After our experiments had been brought to the maximal possible methodological purity in one laboratory in which five experimenters took turns and all obtained consistently positive results, our method was transferred to another laboratory where another group of five experimenters tested the reliability of our results.

Only after such extensive testing and retesting of the experimental controls by representatives of various scientific disciplines (physicists, biologists, and psychologists), did we consider the collected data scientifically valid.

Having described, as an illustration, one specific experiment with a single subject, we will now present our results.

Altogether, 24 subjects, between the ages of 18 and 24, participated in the experiments. They were all students at institutions of higher education in Moscow. The subjects were selected according to their susceptibility to hypnotic suggestion. Each subject participated in from ten to several dozen experiments. A total of over 300 experiments were done.

The synchrony of changes in electrical potentials of the plants with the hypnotist's commands was so high that it could not be considered a mere coincidence, and it occurred in 21 out of 24 subjects. The reason why some subjects do not affect plants requires further study. As we have already mentioned, it probably depends on the emotional type of the person's psychoenergetic system and on the effectiveness of the hypnotist.

Figure 5 shows the experimental set up, which, after long experimentation, proved to be the most favorable arrangement for this type of research. We obtained our basic data using this set-up (Akimova et al., 1975). Figures 6, 7, and 8 represent a typical sequence of commands and the corresponding electrical phenomena which were recorded in our experiments. An arrow marks the moment when a command was given. The tape was 7.5 mm/sec. As can be seen, the electrical responses of the plant follow the hypnotist's commands. Of special interest are responses in the form of strong (50 μV) multiple waves with a fading frequency from a fraction of 1 to 1 Hz (Figure 8).

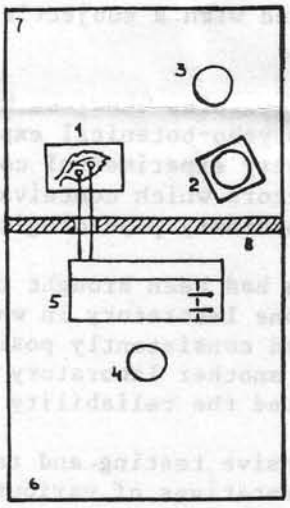

Figure 5 (1) Living plant. (2) Armchair containing the subject of the experiment. (3) Hypnotizer. (4) Experimenter. (5) Electroencephalograph. (6) Experimenter's room. (7) Subject's room. (8) Sealed partition.

We obtained some data which indicated that a plant is capable of responding not only to changes in the mental state of a hypnotized subject, but also to the subject's inner conflicts. We obtained evidence of this kind in experiments on lie detection where, rather than following the usual procedure and using electrodes, we did not connect electrodes to the subject. In these experiments, the plant served as the only indicator of conflict.

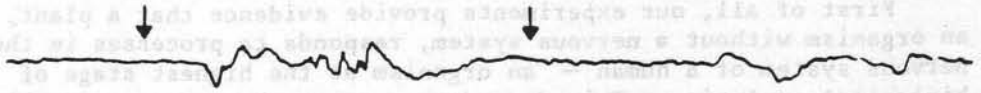

Figure 6

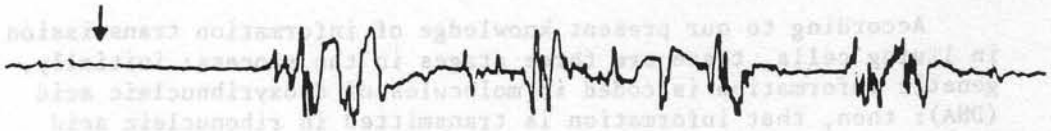

Figure 7

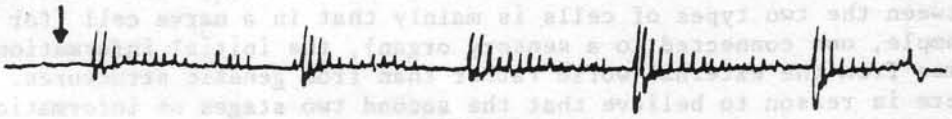

Figure 8

We used the same procedure as in standard lie detection experiments. The subject was asked to think about a number between 1 and 10. The hypnotist made her try her best not to reveal the number. To each number asked of her, she was to answer, "No." After this hypnotic suggestion was made, the experimenter counted out loud from 1 to 10. To each number, the subject answered with an emphatic "No" so that it was rather hard to guess which number she had chosen. The only source of information was the plant; the plant responded with a GSR wave after the number 6 had been named. Later, we learned that this was the number which the subject had actually chosen.

In summary, our research was carried out in two laboratories located in different parts of Moscow. We employed all conceivable experimental controls; we used different subjects and different experimenters, various plants, electrodes, and recording equipment, etc. Our research — which was carried out so carefully — demonstrates that electrical impulses of over 50 μV are generated under the electrodes attached to a leaf of a plant in response to changes in the mental state of a person at a distance of 1 - 3 meters from the plant.

After communication between man and plants had thus been established, my associate, O.I. Motkov, conducted a series of experiments with people who actually used their capability to concentrate and to control voluntarily their autonomic nervous system. In these experiments, the subjects were able to evoke a plant response without hypnosis.

What is the significance of these results for some of the basic problems of psychology?

First of all, our experiments provide evidence that a plant, an organism without a nervous system, responds to processes in the nervous system of a human — an organism at the highest stage of biological evolution. This fact demonstrates, beyond a reasonable doubt, a basic communality of the nature of information transmission in somatic (plant) and nerve cells.

According to our present knowledge of information transmission in living cells, there are three stages in the process: initially, genetic information is coded in molecules of deoxyribnucleic acid (DNA): then, that information is transmitted in ribonucleic acid (RNA); and finally, the information is embodied in protein structures. These three stages of information transmission take place in a somatic cell as well as in the nerve cell. The difference between the two types of cells is mainly that in a nerve cell (for example, one connected to a sensory organ), the initial information comes from the external world rather than from genetic structures. There is reason to believe that the second two stages of information transmission in nerve cells are carried out by the same chemical structures as in somatic cells. Information transmission along the nerve fibre is facilitated by RNA, and the nerve cell stores information it receives in protein structures.

Discoveries in the field of molecular biology have indicated that the general arrangement of the information system of somatic and nerve cells is the same. The results of the experiments on man-plant communication demonstrate that the specific processes in these systems are also the same. A response of a plant cell to mental (i.e. informational) processes in nerve cells is only possible if both these cells "speak the same language," that is, if the communication dynamics in both systems match each other.

Since the animal is a relatively late arrival in the scheme of biological evolution and the nerve cell developed much more recently than the plant cell, it stands to reason that psychological processes of man and animal, i.e. the information processing underlying their behavior, evolved directly from the general form of information transmission which is inherent to life itself, the same system of coding and transmitting information which the plant cell has. Development of organisms capable of moving and, consequently, of actively seeking food, created the need for an information system suitable for modelling the environment and thus controlling behavior. Such an information system developed as a modification and specialization of the information system of plant cells. And specialized cells, neurons, developed to serve this function.

Thus, the psycho-botanical experiments give us a valuable insight into the origins of psychological processes and of the nervous system. The experiments show that psychological processes originate from the information systems of plant cells. This conclusion seems to be well founded. We will now discuss another conclusion, also important for psychology, which, in contrast to the previous conclusion, can only be considered a hypothesis.

Any information must be coded in some material base, for instance, in spoken or written words. What, then, is the material base for psychological structures like images? Traditionally, science searched for the answer to this question in the field of chemistry, in molecules. However, there are theoretical difficulties with such an answer. First of all, molecules can not be used to model objects from the external world. Also, the same molecules can be found in live as well as in dead tissue; the chemical structure of molecules in one type of tissue can not be distinguished from the structure in molecules in the other type of tissue. And psychological processes can only occur in living organisms. Moreover, molecules are static; they cannot be considered the medium in which the dynamics or the process which is the material base for psychological phenomena, is realized. Obviously, overlooking the static nature of molecules and the fact that it is impossible to distinguish between active and "dead" molecules has contributed to the recent failures of molecular biopsychology.

This reasoning leads us to believe that psychological processes are coded, not in cells and molecules, but at a considerably more fundamental level. We believe that they are coded in very fine biophysical processes which use the inner space of information molecules. We have already mentioned that it is just this special psychological physics which makes possible the dynamic coding of psychological processes.

The results of our psycho-botanical studies provide evidence for a sub-molecular, physical hypothesis of the material base of psychological processes. Indeed, the stimulus for the plant in these experiments could have been some biophysical structure which conveyed information about the mental state of the person. A flow of electrons off the surface of this structure may occur when, by experiencing a strong emotion, the person evokes an electrical response in the cells of the plant. Of course, this is still only a hypothesis. One thing, however, is certain: studies of communication between man and plants may yield data which could shed new light on some very fundamental problems of contemporary psychology.

The psycho-botanical experiments described in this chapter can be viewed from different perspectives. For one, it has already become traditional to consider the electrical responses of plants to human psychological states a parapsychological phenomenon, that

is, something beyond the realm of science. However, our comparison of information systems in behavior and in a single cell shows just the opposite; a plant's capability of responding to a human's mental states ought to be incorporated in the body of scientific knowledge. Furthermore, the plant's ability to sense human emotion is an important link unifying various areas of science. This link has made it possible to bring together into one system such seemingly different phenomena as information processes in a living cell and in the human brain. In view of this analysis, to isolate the bio-informational connection between man and plant by relegating it to the realm of parapsychology would be to bury the issue. It would be more rational to continue these studies and analyze the results from the point of view of a variety of contemporary scientific disciplines. Thus, man-plant communication, traditionally isolated within parapsychology, is a good example of the attitude one should have towards parapsychological phenomena in general: rather than isolate them, one should make them an object of a multifaceted scientific analysis.

Our story about communication between man and plants has not been finished yet. A stimulus for further experiments was the attitude of our sceptical colleagues. Satisfied that our experiments with plants were well controlled and that the plants' responses to changes in mental states of our subjects were, indeed, an established fact, the sceptics attacked our interpretation of these results.

The sceptics said that our experimental results provided no evidence at all that some physical processes, hitherto unknown to science, serve as means of communication between living organisms. According to the sceptics, the explanation of this phenomenon is entirely different. When a person experiences a strong emotion, powerful chemical reactions occur in his skin and chemicals are released. These chemicals reach the plant and evoke a GSR which the electroencephalograph duly records. Also, the physical factors should not be overlooked. Rather than some mysterious radiation, still unknown to contemporary science, simple changes in body heat radiation which may occur during emotions might affect the plants.

This was the line of criticism from our sceptical colleagues, and we have to admit that their friendly criticism turned out to be very fruitful. It gave us a stimulus for a new series of experiments designed to demonstrate that the mental image itself, as an informational-psychological reality, and its material base directly caused the plants' GSR in our experiments.

To demonstrate the direct effect of a mental image, we recorded responses from two plants (rather than one) placed on a table next to each other and at the same distance from the subject. As in the first series of experiments, emotions were induced in the subjects only after the plants had calmed down and the pens of the

electroencephalograph had started to record straight base lines. The two additional channels of the electroencephalograph were connected, one to a pair of electrodes clamped together, and the other to a pair of electrodes hanging in midair.

After being hypnotized, the subjects were made to identify alternately with one plant or the other. In each case, strong emotions addressed to one specific plant were induced in the subjects.

As a result, we obtained recordings alternately from each plant, each responding only when the emotion of the subject had been directed to it, while there was no response from the other plant. Switches between the two plants as recipients of emotions have been regularly and successfully performed many times. In each time, GSR has been recorded only from the plant to which the subject's emotions were addressed.

This simple experiment allowed us to reject the hypothesis that the GSR of the plant was due to the release of chemicals in the subject's skin. Both plants were at approximately the same distance from the subject, so any chemical release would reach both plants at the same time and evoke GSR simultaneously in both of them. Using the same reasoning, we rejected the other hypothesis, that changes in the subject's body temperature evoke GSR in plants.

Thus, the sound criticism of our honest and friendly sceptics led to an experiment which eliminated the most obvious, and most likely, hypothesis. This case has been very instructive. It shows that, in studying strange phenomena, sceptics are helpful and, in a way, necessary, provided that they are honest and interested in furthering our knowledge, rather than in proving their preconceived hypotheses.

As a result of our control experiment with two plants, only one hypothesis remained. This hypothesis is the least probable from today's traditional scientific perspective: namely, that somehow, the material base of the signal sent by man must contain the structure of the image of the specific organism to which it has been addressed. Thus, in our experiment, the specific image of only one of the two plants evoked a response from that particular plant. It follows from this hypothesis that, at the moment his emotional state changes, the human subject generates a living code of the plant rather than an inanimate code, a simple sequence of symbols. The plant interacts with its image which is coded in the message; as a result, the plant — and no other plant — produces a GSR.

For the time being, we will refrain from speculating about the nature of the material base of the image. Perhaps there is an interaction between the image as a holographic wave and the object as a stabilized wave structure. The wave hypothesis of the universe would easily explain the interactions observed in our experiments.

We have to admit, though, that the interactions we have described are rather exceptional. Our findings demonstrate the difficulties of studying bio-informational interactions. To establish man-plant communication, it was necessary to remove, through hypnosis, the control of the frontal lobes of the subject. Then, again through hypnosis, it was necessary to induce sufficiently strong emotional states. The intensity of the emotional states involved in the experiment demonstrates that the form of communication we have recorded requires a fairly powerful psychoenergetic base.