THE BACKSTER EFFECT

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Mr. Cleve Backster has, since 1966 (1-4), presented to the lay and scientific community claims that a large variety of living materials (primarily plants, but also including hen's eggs, paramecium, amoeba, mold cultures, scrapings from the roof of a human mouth, and yeast) will produce characteristic electrical signals when connected to a polygraph machine. The signals obtained, in Mr. Backster's opinion, closely resemble the outputs seen when human beings undergo lie detector tests. That such signals are indeed produced is not surprising. What is unexpected is Mr. Backster's contention that they result from the perception capabilities of the materials.

The processes of life are such that in living systems a large variety of conditions exist which give rise to electrical charge separations with attendant electrical potentials. These potentials are interconnected by the salt containing fluids of living systems which in turn are contained in materials having diversified electrical properties. The result is an extremely complicated electrical circuit consisting of a multiplicity of parallel and series connected potentials, resistances, capacitances, and reactances. Thus, if current flow in such a system is monitored by connecting it to a psycho-integroammeter (lie detector) one should not be surprised to see a large variety of current changes many of which will resemble typical polygraph outputs. A multitude of seemingly insignificant events can conceivably change the impedance of such a circuit through their influence on the resistance, capacitance, reactance or potential generating characteristics of the system. For example, a change in the position or strength of any nearby electrical or magnetic field can induce a voltage in a critical part of the circuit which will result in a large change in the current flow as read by the attached ammeter. Such changes can be brought about by the mere repositioning of the observer's body or motion of his limbs. Likewise, small changes in the chemical makeup of the system due to such things as adsorption of odors or water vapor can appreciably change the resistance or capacitance of the system which will change the matching characteristics

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between the readout ammeter and the circuit giving rise to impedance mismatches and a consequent change in readout. In addition, the internal environment of a living system is constantly undergoing change due to cell division, elongation, and maturation. These changes may also alter the impedance and voltage generating characteristics of the living system and result in a variety of changes in the current readout.

Figure 1 shows some voltage changes which have been induced at a distance of 1 meter in a human hair (stretched between two platimum electrodes and made to be semiconducting by coating it with glycerol and a liquid soap) by a vibrating barium titanate crystal. It is evident that the vibrating crystal induces a voltage in the hair preparation which is related to the first derivative of the frequency of the vibration and therefore, it is probably a reflection of the change in the electric field at the barium titanate crystal. Since the hair preparation is derived entirely from materials found in living systems and its structure is due largely to the hair (a former living material) it is reasonable to expect that this preparation has an equivalent electrical circuit which resembles, in many ways, that found in living tissues. Thus, if voltage changes can be induced in this preparation, there is reason to expect that they can also be induced in living systems.

There seems to be no reason to doubt Mr. Backster's observations of polygraph readouts from a variety of living materials. On the other hand, his explanation for these observations warrant some comments. Many of the experiments which Mr. Backster has conducted appear to lack adequate controls and almost all of his explanations or implied explanations for the results are at best impulsive. He concludes that his readouts are the result of single cell activities and, therefore, possessed by all living systems. However, his experiments are often designed to show a one to one correspondence between a polygraph readout and a specific event which is really only one example of a constantly occurring phenomenon. For example, in order to show that plants are sensitive to the death of other organisms, even at a distance, he dumps brine shrimp into boiling water and observes the polygraph responses of plants

located in another room. But if, as he purports, this experiment shows that plants are sensitive to the death of other organisms, why are the plants atuned only to the death of these particular organisms? Certainly, there are millions of microorganisms dying in the same room with the plants and undoubtedly a number of household pests such as ants, flies, and the like are also dying in various parts of the house not to mention the variety of fresh vegetables and meats being prepared in the neighborhood kitchens. Likewise, Mr. Backster has a marked tendency to look for teleological explanations for his work. He always relates his polygraph patterns to psychic or physical phenomena seen in human beings; i.e., emotional stimulation, "fainting", heartbeat, nervousness, even prayer. This is a basic error which can mask and distort the possibility that the observed phenomena can be used for useful and perhaps unique purposes. It is not necessary to resort to explanations which transcend the physical laws we know now. An approach which seeks to interpret the results within the framework of known phenomena will be far more useful. Consider the possibility that the house plant, for example, acts not only as a biased electrical circuit, but also functions as a high impedance antenna. Such a system can be disturbed by changes in small electrical fields, perhaps even of the magnitude produced by brain waves and blood circulation. After all devices are available that can detect at a distance magnetic fields generated by blood circulation and brain waves (5-6). Also, the surface area of a plant is quite large and well adapted to gas exchange reactions so that trace amounts of chemicals emitted from animals can be absorbed by the plant and lead to pronounced changes in plants and their electrical circuitry. For example, plants change their metabolism and undergo leaf epinasty in response to a concentration of ethylene of as little as 0.002 microliters per liter of air (7-8). The events triggered by conscious or unconscious nervous reactions (odor emission, increase in heart rate, change in brain wave pattern, etc.) on the part of an observer, which go undetected by him, could conceivably cause changes in delicately balanced electrical circuits including those existing in living systems. Under these circumstances, the electrical readout from an instrumented plant could change in response

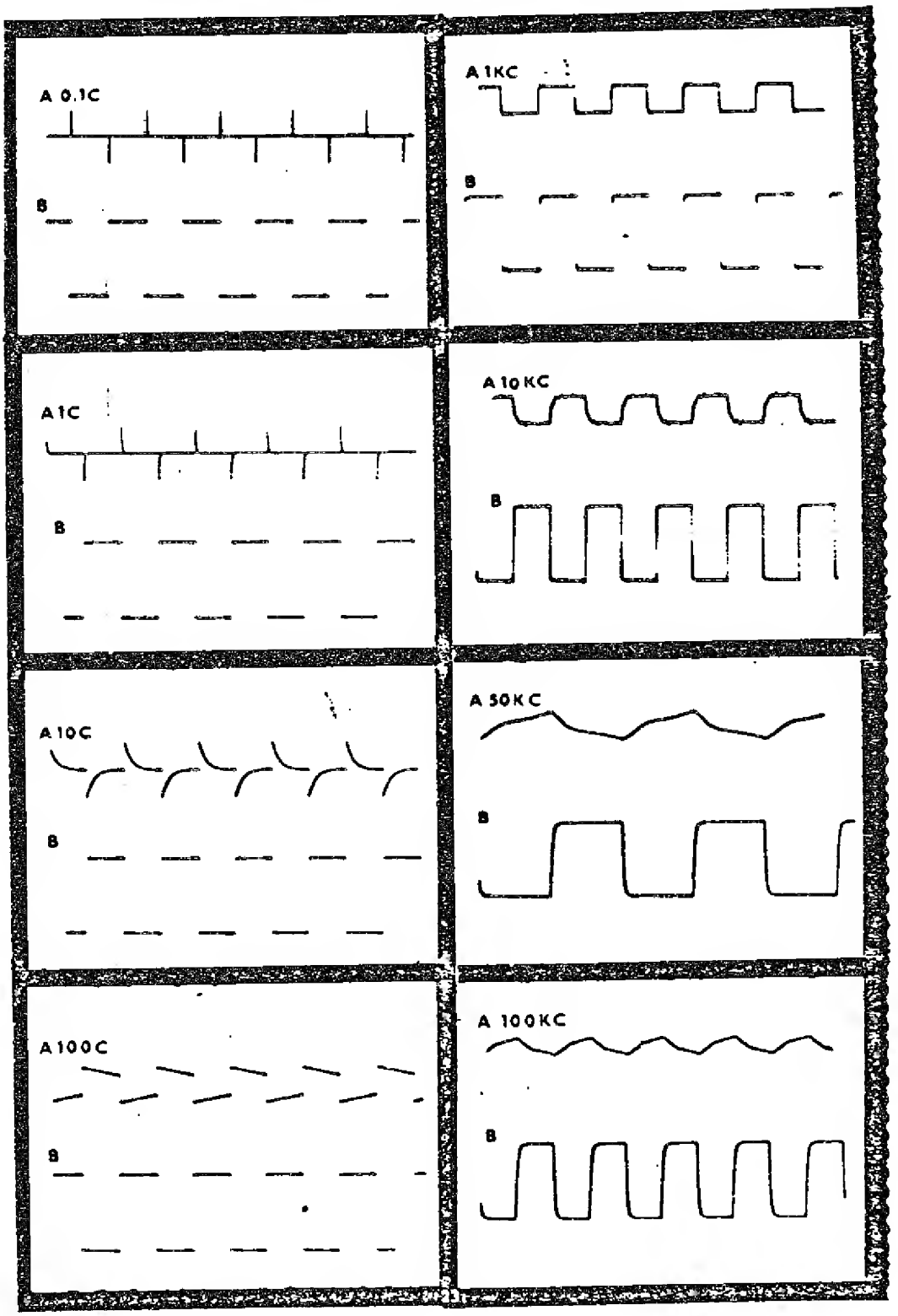
to the emotional or physical state of an observer. However, the response would in no way be a case of the plant reading the individual's mind. Rather, it would be due to changes in the plants environment brought about by the observer and resulting in a change in the electrical characteristics of a delicately balanced system.

The possibility that very subtle changes in the environment alter the electrical properties of plant tissues is not unreasonable. Such changes are everyday phenomena in animal sensory organs and the structures and electrical status of plant cells have many features in common with nervous tissue. The most essential difference may actually be in the organization of the cells. In the animal, the cells are arranged to provide quick reaction times, centralized information depository and specialized information sorting together with feedback and compensatory reactions. In the plant, on the other hand, the cells are not organized in this manner and although their electrical properties may change with the environment, the phenomenon is of limited use to the plant. However, if man monitors these electrical changes, he may be able to correlate them with subtle changes in environmental factors which are of interest to him much in the same way that the receptor potentials of various nervous tissues (visual, olfactory, tactile, etc.) can be used to supply information on, for example, odor concentration, light intensity, and pressure.

It is suggested that a program be carried out to investigate the possibility that changes in the electrical properties of plants are induced by subtle changes in the environment. Methodologies which are similar to those now used to explore receptor potentials in nervous tissues could be employed and the characteristics of any signals observed correlated with such things as trace amounts of odors introduced into the environment or minute changes in electrical and magnetic fields.

FIGURE 1. Response of Human Hair Coated with Liquid Potassium Soap and Doped with Octanol.

In each case, trace A is the response from the hair and trace B is a record of the signal driving the barium titanate transducer. The numbers indicate the frequency of the driving signal. Traces A and B were made simultaneously with a dual beam oscilloscope.


A 0.1C
B
A 1KC
B
A 1C
B
A 10KC
B
A 10C
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A 50KC
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A 100C
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A 100KC
B

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