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# FOREIGN TECHNOLOGY DIVISION


## MYSTERIOUS PHENOMENA OF THE HUMAN PSYCHE

by

L. L. Vasil'yev

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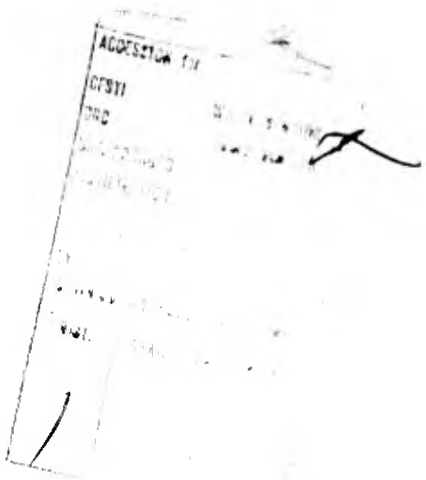

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By: L. L. Vasil'yev

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L. L. Vasil'yev

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ABSTRACT: This book by L. L. Vasil'yev, Corresponding Member of the Academy of Medical Sciences, exposes the superstitions engendered by a naive, narrow interpretation of certain "mysterious" neuropsychological phenomena. Sleep, unusual dreams, hypnosis, autosuggestion, "mind reading," the long-distance transmission of thought, death, and experiments in the revivification of animals and human beings are all discussed in a fascinating manner and numerous interesting examples are given. Page after page, this book speaks of the great power of true science armed with the materialistic outlook, which, in the struggle against superstition and religion, is extending our knowledge of the nature of the human psyche step by step. In 1959 a large edition of a book of the same title by L. L. Vasil'yev was quickly sold out. As a result of the interest shown in this book by the most diverse groups of readers, a new edition was prepared in 1963; the author made certain corrections and additions and even wrote two new chapters: "What can be said about 'extrasensory perception'?" and "Is transmission of muscular force at a distance possible?". The present edition is based on the text of the previous edition augmented by some new material on hypnopedia (in Chapter 3), dermovisual perception (in Chapter 7), etc.

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1. MYSTERIOUS PSYCHIC PHENOMENA AS A SOURCE OF SUPERSTITION

In bygone days, when the sciences of nature and man were very young, man regarded anything unusual as enigmatic and mysterious and it gave rise to superstition and prejudice. Man himself seemed helpless before nature, which was filled with secrets and miracles. Solar and lunar eclipses, comets, meteors, severe storms, and all celestial and meteorological phenomena so unusual as to be frightening were assumed to be omens of approaching war, famine, plague, or other disasters.

In a society with classes this fear is enhanced by the fact that the working man is under the yoke of the ruling classes, a pawn in their hands, and his life can at any time be wagered for the mercenary purposes of feudal conquerors or capitalistic exploiters. Ignorange of the laws governing the development of human society thus reinforces the fear of incomprehensible natural phenomena and makes superstition a means for the spiritual enslavement of the masses.

Menacing or inexplicable phenomena of a biological character were another source of superstition. Epidemics of smallpox, cholera, plague, and other diseases, which devastated the population of entire nations in antiquity, were thought to be punishments inflicted by an angry god, machinations of the devil, or the magical acts of sorcerers and witches. Mental illnesses, which sometimes took the form of "psychic epidemics," were interpreted as possession by an evil spirit, as an evil spell or "bewitchment" resulting from magical operations. According to rough estimates, approximately nine million persons accused of dealing with the devil died at the stake or under torture during the Middle Ages.

The last burning of a "witch" by the Inquisition took place in Spain in 1780.

Echoes of these previously menacing superstitions persisted in Russia in the form of hysteria, fortune-telling, faith in objects and amulets, belief in fate ("that which is preordained"), etc., down to the Great October Socialist Revolution.

Stories still occasionally appear in Soviet newspapers about isolated manifestations of certain types of popular superstition. For example, several years ago it was reported how, in the city of Orsk, a certain Tamara Petrovna, in the guise of a "witch", employed magical techniques to "treat" young girls for the "evil eye," extorting money and goods from them.* I know of a similar case that took place not long ago in as noted cultural center as Leningrad.

This is an example of blind faith bordering on fanaticism: a woman, the mother of two children, was deserted by her husband and hoped that, by crawling around a "sacred" lake on her knees, she would, with "the help of God," get him back. When she was brought to the hospital she could scarcely stand on her feet and her knees were lacerated and bloody.**

Marxist-Leninistic philosophy has shown that the source of superstition and prejudice is not merely a lack of knowledge of the true laws of nature or the ignorance and misery created among the masses by capitalistic exploitation. The anarchy of capitalistic production in itself gives rise to the feeling that the individual is helpless before alien forces of social development and this feeling predisposes him to a mystical perception of reality.

The great scientific achievement of K. Marx and F. Engels was specifically the fact that, having discovered the true laws of the development of human society, they thus created the necessary prerequisite for

elimination of religious-mystical prejudice in this area.

A war of extinction has been declared on superstition in the Soviet Union. Our social order and the systematic, day by day dissemination of political and scientific knowledge among the masses will lead to the final eradication of pseudoscientific ideas about nature, man, and society. It can be said that the sources of many of our superstitions and prejudices have already dried up: what Soviet citizen assigns mystical significance to a phenomenon such as a solar eclipse or an influenza epidemic?

Certain areas of the ideological struggle against superstition, however, still require special attention. We have in mind the superstitions engendered by a naive, narrow interpretation of certain real phenomena of a neuropsychological nature.

These phenomena pertain principally to the area of twilight states of consciousness and various motor automatisms. Some of these are very common or are encountered comparatively frequently, including dreams and different manifestations of autosuggestion and suggestion in the waking state. On the other hand, others are rarely encountered, but act more forcefully on the imagination. These include hallucinations, various types of hypnotic sleep, and certain other psychopathological phenomena, which are observed principally in persons suffering from hysteria to a greater or lesser extent.

An unusual trend in scientific thought, called parapsychology or metapsychology,* has now received rather wide recognition abroad. It has set itself the task of utilizing observation and specially designed experiments to confirm or conclusively disprove the existence of certain rarely encountered and seemingly improbable psychic, or rather psychophysiological, phenomena. The latter include the perception of the psychic experiences of another person without the intermediary of

speech or any of the sense organs (the so-called direct transmission of thoughts or feelings, telepathy), the perception of objects and phenomena without the intermediary of any known sense organs (extrasensory perception,* telesthesia, or, the older term, clairvoyance), and the transmission of muscular force and its mechanical action on living and nonliving bodies at a distance (so-called telekinesis).**

Materialists can neither ignore nor deny the a priori character of everything pertaining to parapsychological phenomena, even though they do not square well with that which science at present regards as universally recognized. To refuse to subject these phenomena to thorough experimental verification is to give them over into the arsenal of the idealists and thus promote even deeper penetration by the roots of superstition.***

However, the most important and most common source of popular superstitions and religious beliefs has always been and still is a phenomenon that terrifies human consciousness – death. The fear of death and the grevious sorrow caused by the demise of persons near and dear gave rise to one of the principal bulwarks of religion, belief in the immortality of the soul, in its successive reincarnation in a series of living beings, or in the existence, albeit temporary, of some posthumous fragment of the personality, which can communicate with living persons.

During the prerevolutionary period these phenomena were an ineradicable source of religious and popular beliefs, omens, prophecy, and magical procedures for healing and fortune-telling. In the more highly educated strata of society the same phenomena gave rise to various pseudoscientific occult (secret) "teachings," such as animal magnetism, mediumism, spiritualism, etc. It must be admitted that residues of this heritage from the past are still heard from today.

The struggle against popular and "doctrinal" superstitions cannot and should not be conducted separately from antireligious propaganda. So long as religion exists, superstitious ideas incompatible with the achievements of science will remain hidden in certain minds and reawaken from time to time.

Our task is to dispel the aura of mystery surrounding the phenomena that engender superstitions, to explain them scientifically. The great discoveries made by I.M. Sechenov and I.P. Pavlov in the physiology of the brain and of higher nervous activity, especially the Pavlovian theory of sleep, dreams, hypnosis, and suggestion, supplemented by data from materialistic psychology and psychopathology, furnish us with superior arms for the fight against superstition. The achievement of one of the newest branches of medicine, thanatology, the science that deals with the processes of death and the possibility of revivifying living beings, including man, serve the same purpose.

Manuscript Page No.

[Footnotes]

3* See Komsomol'skaya Pravda [Young Communist League Pravda], 24 December 1958.

3** See Zvezda [Star], 1958, No. 12.

4 The Greek prefizes "para" (near) and "meta" (after) emphasize that parapsychic (metapsychic) phenomena lie outside the scope of traditional psychology. These paranormal psychic phenomena are referred to in abbreviated form by the Greek letter psi – Ψ.

5* Abbreviated ESP in English.

5** We must give due credit to French scientists who have investigated such phenomena and, while dealing with the most improbable facts, have not strayed from scientific principles. This is true of Charles Richet, who published the first summary of data on parapsychological problems (Traite de Metapsychique [Treatise on Metapsychology], Paris, 1921], of his followers E. Ostey, J. Roux, R. Varcollier, and R. Herumian,

[Footnotes]

and of Robert Amadou, who compiled a recent survey of parapsychological data (La Parapsychologie (Essai historique et critique) [Parapsychology (A Historical and Critical Essay)], Paris, 1954). Unfortunately, the same cannot be said of many English and American parapsychologists, who introduce their idealistic philosophical convictions and religious beliefs into their parapsychological research. This was true of the Anglo-American founders of parapsychology, W. Barrett, F. Meyers, W. Crooks, and W. James. Later investigators have followed the same path.

5*** In the first edition of "Tainstvennykh yavleniy cheloveheskoy psikhiki" [Mysterious Phenomena in the Human Psyche], I touched briefly on parapsychological data in the chapter entitled "Is There a 'Mental Radio'?". In the second edition of this book I felt it useful to add two new chapters containing noteworthy information on this branch of psychology. With slight changes and addition, they have been retained in this, the third edition. The future will show which of these data must be discarded as being the result of observational and logical errors.

## 2. SLEEP AND DREAMS

In ancient times dreams were regarded as revelations of the gods. People believed that benevolent and evil spirits could enter a sleeper's body and, through dreams, impart various information to him, inclining him toward certain actions and forshadowing real events. However, it was remarked that the gods and spirits preferred to express themselves ambiguously, sometimes symbolically, permitting individuals themselves to unravel the hidden meaning of dreams. This was considered to be no easy matter and was permitted only to priests and professional dream interpreters.

This view of dreams was associated with animistic concepts (from the Latin word anima, meaning soul). It was thought that during sleep the soul could temporarily leave the body, move through space, and be transported into the past and the future, while still maintaining some link to the body. The wandering soul gathers impressions, which the sleeper perceives as dreams, as pictures of unknown lands, as images of unfamiliar things and of familiar and unfamiliar persons, living and dead.

In time this notion was superceded by another, more advanced but still naive: the soul does not leave the body, but instead psychic faculties hidden in the waking state are aroused in the sleeper, the most important of these being clairvoyance, the ability to foresee the future and to learn of events taking place at great distances. Both are perceived by the sleeper in some mysterious fashion, without the intermediary of the sense organs, and are experienced as dreams.

In antiquity such ideas gave rise to a special type of prophecy from dreams, "oineromancy." In the 2nd century A.D. a certain Artemidor, a Greek from Daldis, produced the first "dream book," a set of rules for interpreting dreams. Here is an example of this art, taken from his book: "If an artisan sees that he has many hands this is a good omen: he will always have enough work. His dream signifies that he will need many hands. Moreover, this dream augers well for those who are diligent and lead orderly lives. I have often observed that it means many children and slaves and much poverty. On the other hand, for swindlers this dream foretokens prison, indicating that many hands will seize them."

Even many philosophers and physicians worked on the interpretation of dreams during the Middle Ages. Among these the Italian physician G. Cardanus (16th century) was held to be especially authorative; his interpretations were carefully copied by successive compilers of "dream books" down to the 20th century. When various "dream books" are compared it is readily seen that the same dreams were interpreted differently at different times.

We must also mention the popular omens associated with dreams. The majority of these signs are the purest nonsense, but it cannot be denied that some display a certain measure of popular wisdom and observation. It was for this reason that, in considering the hidden meaning of certain popular omens, the noted Russian physiologist N.Ye. Vvedenskiy wrote;

"It is noteworthy that, as the depth of sleep increases, impressions from earlier in the individual's life are associated and interpreted; in shallow sleep only the more superficial layer of the memory is involved, while in deep sleep interpretations are drawn from deeper, more remote impressions. In our peasants there arose the belief that dreams of long dead parents mean that the weather will be bad; there is

perhaps some sense in this, since bad weather is usually preceded by a period of deeper sleep, which is characterized by dream images from the remote past."*

The beginnings of the scientific approach to the study of dreams lie at the end of the 18th century. One of the first more or less serious works on this topic, Doctor H. Nudow's "Opyt postroyeniya teorii sna" [Construction of a Theory of Sleep];** appeared in 1791. Among other things, this author cited a valuable observation that served as the starting point for subsequent investigations in this area: several drops of water were introduced into the open mouth of a sleeper lying on his back. He turned over onto his abdomen and began to make swimming movements with his hands and feet; he dreamed that he had fallen into the water and was forced to swim for his life.

Observations of this type show that dreams can arise from accidental stimulation of the sense organs during sleep. Moreover, the action of some stimulus (sound, light, or touch) on a sleeper occasionally makes it possible to intentionally induce dreams that clearly correspond to the character of the stimulus applied. A new procedure for the experimental study of dreams was thus discovered. A particularly large amount of work in this field was done by the French scientist A. Morie and the German scientist W. Weigand, who devoted their lives to investigating the factors that cause dreams. V.M. Bekhterev and M.I. Astvatsaturov were occupied with this problem in Russia; the latter studied the characteristics of the contents of dreams in the presence of diseases of various organs and was one of the first to use this procedure for diagnostic purposes.

Morie recounts*** that once, while he was asleep, a bottle of eau-de-cologne was placed under his nose; this was sufficient to cause him to dream of a perfume shop, of Cairo, and of the East, which he had not

long before had occasion to visit. In another experiment Morie shown a red light on a sleeper's face; the subject dreamed of flashes of lightening and peals of thunder. In a Swiss hotel filled with travelers almost all the guests had the same dream during a thunderstorm one night: into the courtyard, with a deafening noise, comes a carriage bearing new travelers, who crowd those staying at the hotel still further. These data indicate the influence of external stimuli on cerebral activity during sleep.

An interesting characteristic of the dreaming process is the fact that content-rich dreams, which appear very protracted to the sleeper, actually take place quite rapidly, within a few seconds. Ideas of time and space are greatly distorted during sleep. Let us describe one such case. A well-known dramatist, attending a presentation of his play, fell asleep as a result of fatigue and ill health. In a dream he saw the entire play from beginning to end, followed the development of the action, and saw how his work was received by the audience. Finally the curtain fell to deafening applause, the dramatist awoke, and, to his amazement, he heard that only the first cues of the first scene had been given on the stage. The entire play that took place before his eyes during his dream thus occupied only a few seconds.

The fact that ideas and memories can pass through the mind with unusual, supernormal speed in the waking state is indicated by the statements of persons who have survived an instant of mortal danger. During such an instant memories of almost all the individual's past life pass before his eyes.*

A no less frequent source of dreams is stimulation reaching the brain from the internal organs (the stomach, intestines, bladder, lungs, heart, etc.) rather than from the external world. All these organs are sensitive and are connected to the "organ of the psyche," the cerebral

cortex, by neural pathways. During the day we generally do not notice the "signals" from the internal organs, since our consciousness is occupied by stronger impressions of the external world. At night the situation is different: the less vigorous the activity of our external sense organs, the more distinctly we sense stimuli arising in our internal organs, especially those produced by painful processes. The distressing nightmares that frighten superstitious persons develop in this manner. Disruption of normal cardiac or respiratory activity during sleep is the most frequent source of such dreams. Here we dream that we are running, that we are dead tired, that we are pursued by wild animals or thieves, or that we are in danger of drowning or of being suffocated in a fire. In his experiments, the German psychologist I. Berner plugged the nostrils of sleepers with cotton and almost always observed the following phenomenon: the sleeper began to talk and moan and then awoke and reported a dream in which some steadily growing monster threatened to suffocate him. "I was suffocated by a brownie!" Peasants used to declare when they spoke of such dreams.

Dreams caused by stimulation of internal organs may be of diagnostic value. From them the experienced physician can sometimes recognize the onset of an internal disease that does not make itself felt in the waking state, not displaying any of its typical symptoms. Many examples of this are known. A patient of a certain physician dreamed that one of his feet "turned to stone" and that he lost the ability to control it; sometime later this foot became paralyzed. Another patient dreamed for several months that he was swallowing objects; the cause of this frequent dream proved to be a malignant tumor developing in his pharynx. The German natural scientist and physician K. Gerner dreamed that he had been bitten in the chest by a snake and, after some time, a slow-healing ulcer appeared in this area. In all these cases the onset of

illness was unnoticed by the waking consciousness, which was occupied with the impressions and anxieties of the day.

These data on the influence of the activity of the internal organs on the content of dreams were long inexplicable. It remained for the Soviet physiologist I.P. Pavlov and his colleagues, particularly K.M. Bykov, to discover the mechanism by which the cerebral cortex interacts with the internal organs. They were thus the first to give a scientific explanation of these data. Their experiments and observations, which established the role of the external and internal sense organs in the development of dreams, opened the way for modern physiological concepts of the nature of dreams and sleep. Of no less importance was another major discovery: the theory of the localization of psychic functions in the cerebral cortex was worked out in the 1860's and 1870's. It was demonstrated that all the sense organs are represented in the cortex: the visual organs are associated with an area in the occipital lobe, the auditory organs with an area in the temporal lobe, and the tactile organs with an area in the parietal lobe. Shortly thereafter there appeared a noteworthy monograph by the Russian doctor B. Oks, in which dreams were treated as a result of the partial activity of indiviaul areas of the brain during sleep. Here is a brief extract from this undeservedly forgotten work:

"We can easily imagine that a certain group of cells (cortical neurons – Author), in which a definite type of mental activity is concentrated, temporarily ceases to function under the influence of a soporific substance: during this period the waking group perform their function and this partial cerebral activity explains both the low level of mental activity (during sleep – Author) and the incoherence and absurdity of many dreams. Sudden stimulation (of the sense organ – Author) again induces activity in the region (of the cortex – Author)

in question and then inhibits some or all of its (previously – Author) active cells."*

Conjoined twins aged 1 year, 22 days. Ira (right) sleeps while Galiya is awake.

Dreaming is a partial activity of the sleep-depressed cortex caused by various types of stimulation of the external and internal sense organs. This is the essence of Dr. Oks' hypotheses, which were advanced more than 80 years ago but are close to the modern theory of sleep and dreams experimentally substantiated by Pavlov and his colleagues. Oks erred only in his conception of the factors leading to depression of the cortical cells during sleep. He assumed (as did almost all his contemporaries) that one such factor is autointoxication of the cortical cells with metabolic products, "sleep toxins," which accumulate in the blood and cells in the waking state and have a soporific action similar to that of narcotics. In actuality, we fall asleep before toxic metabolic products have a chance to accumulate. We can nap soundly even in the morning, after a full night's sleep, when "sleep toxins" are out of the question. It is only in exceptional cases, where wakefulness is maintained for several days by artificial means and the need for sleep becomes painful and unbearable, that autointoxication comes to play a major role.

This is shown by the interesting observations made by Moscow professor P.K. Anokhin in 1939 on a rare subject, a pair of conjoined human twins. These twins had a common trunk, one heart, and a common circulatory system, but two heads and two brains. It was often found that one head slept while the other remained awake. This means that it is not a humoral factor (the composition of the blood) that plays the

principal role in dormition. In the case under consideration the two brains, which were supplied with blood of the same composition, could be in different functional states, one depressed and the other wakeful.

What beneficial factor forces us to fall asleep in time and thus protects our brain and body from excessive fatigue, from the danger of autointoxication? Pavlov, in classic experiments usilizing the formation of conditioned reflexes, showed that the factor that causes sleep is inhibition of the nerve cells composing the cerebral cortex.

Rhythmic neural impulses reaching the cortical cells from the sense organs can exert a twofold action on them under different conditions, producing an active, excited state or, conversely, inhibiting this active state, disengaging the nerve cells. Excitation and inhibition are the basic neural processes; without them neither motor acts nor psychic experiences would be possible.

Excitation and inhibition are two aspects, two processes of higher nervous activity. As a result of their interaction external stimuli are analyzed and synthesized in the cortex in accordance with their importance to the vital activity of the organism; the dynamics of excitation govern the character of the organism's reaction to external and internal environmental factors.

The waking state corresponds to a so-called dynamic (labile) "mosaic" of foci of cortical excitation and inhibition. The spatial distribution of these foci is continually changing as a function of the activity being carried out at the moment and of the organism's psychic state. When I read a lecture foci of stable excitation are found in those areas of the cortex that handle the function of speech and effect thought; all other regions of the cortex are more or less deeply inhibited. However, if I move on to another type of activity, e.g., begin to play the piano, the cortical "mosaic" is immediately altered: the

previous foci of excitation are inhibited and new foci develop in other groups of cortical cells. A total of 14-15 billion nerve cells (neurons) have been counted in the human cerebral cortex. The number of possible spatial combinations of excited and inhibited cortical foci is truly immeasurable. Each such combination reflects certain factors of different psychic states.

What happens to the waking cortical "mosaic" when we fall asleep? An especially stable focus of inhibition develops at some point in the cortex. Weak monotonic stimuli (a lullaby, rocking, the ticking of a clock, etc.) may promote formation of such a focus. Inhibition begins to "irradiate" from it as from a center, spreading to adjacent neuron groups and then farther and farther, nullifying the foci of excitation it encounters and ultimately encompassing the entire cortex and all its neurons. Deep, dreamless sleep with no manifestations of psychic activity sets in. The cortex, the "organ of the psyche," is completely at rest.

Sleep consequently develops as a result of dominance of the inhibitory process in the cortex. I.P. Pavlov pointed out that such inhibition is of "protective" value to the organism, facilitating relaxation of the entire body and especially its most precisely organized apparatus, the cerebral cortex.

It can thus be said that the somnifacient inhibition that propagates through the cortex serves as a "guardian angel" for the cortex and the entire organism. Moreover, it sometimes seems to play the role of a "miraculous healer," rapidly renewing (resynthesizing) the complex chemical compounds of the cerebral cells necessary for the normal functions of the brain and psyche, which are expended during intense diurnal activity. Insufficient replenishment of these compounds from day to day leads to disorders of the brain and of the bodily organs that it

controls. We can understand why such diseases are treated by artificially prolonged sleep, the so-called sleep therapy introduced into medical practice by I.P. Pavlov and his followers. It may happen, however, that anxious or creative thoughts or violent emotions keep us from falling asleep. In such cases foci of especially strong and stable excitation are acting in the cortex, preventing irradiation of inhibition and the onset of sleep. If sleep does set in it is incomplete, or partial. A "sentry post of excitation" persists in the cortex, like a rock in the spreading sea of inhibition. Through this excitation the sleeping brain can remain in contact with its surroundings. A soldier exhausted by a difficult march sleeps deeply, but at the least alarm he is on his feet and looking for a weapon.

I.P. Pavlov and his colleagues (B.N. Birman* et al.) reproduced similar phenomena in noteworthy experiments on dogs. For example, a conditioned salivation reflex is induced to a definite tone on a harmonium, "do." Each sounding of this tone is accompanied by an unconditioned stimulus to salivation – a feeding. When the conditioned reflex to the tone "do" has been developed other tones on the harmonium ("re," "mi," "fa," "sol," etc.) also cause salivation. Their action, however, is not reinforced by feeding and their signal value fades. In time, only the reinforced tone "do" causes excitation in the corresponding cortical center, all the other tones of the harmonium producing foci of "internal," or "differentiated" (in Pavlov's terminology), cortical inhibition. It is now merely necessary to sound one of these inhibitory tones, such as "mi," for an extended period for internal inhibition to begin to irradiate from its focus. When it has spread over the entire cortex the dog falls asleep. Such experimentally induced sleep is quite similar to ordinary sleep in which a "sentry post" is maintained in the cortex: as soon as it hears the fool-reinforced excitatory conditioned

stimulus, the tone "do," the dog awakens, begins to look for food, and salivates.

Sleep accompanied by dreams is another type of incomplete inhibition of the cortex. If sleep is deep the cortex is profoundly inhibited and the excitatory impulses reaching it from the sense organs do not register; no dreams occur. Toward morning, when the cortical cells are sufficiently rested, the protective inhibition is relaxed and the impulses reaching the cortex begin to make their way into the maze of neurons with intertwined dendrites. Like a will-o'-the-wisp, excitation moves from one group of cortical cells to another, deinhibiting them, and reanimates the capricious succession of images, predominantly of a visual character, that we call a dream. The clarity and vitality of the images thus evoked is astounding. The imagination cannot picture anything similar in the waking state. The vividness of dream images evidently played a major role in the development of superstitious ideas of a life beyond the grave.

Many characteristics of dreams, particularly their extremely graphic and fantastic character, are explained by Pavlov's theory of the two signal systems. The ordinary stimuli of the external world (auditory, visual, olfactory, etc.) become signals for unconditioned stimuli and may replace them during the formation of conditioned reflexes. Thus, for example, in the experiment by Birman described above, the tone "do" became the signal for an alimentary reaction, replacing an unconditioned alimentary stimulus. The aggragate of such signals and the conditioned reflexes they produce, the first signal system, forms the basis for the psychic activity of higher animals and children who have not yet learned to speak. This system was dominant in primitive man, in whom oral and internal speech (with which thought is directly associated) was at a low level of development. Lack of speech means

lack of concepts and logical thought (the manipulation of concepts); at this level of development thought is possible only in concrete images and associations involving contiguity, similarity, and opposition, but how vivid, how unrestrained and fantastic these associations are! With the development of speech the first signal system is joined by the second signal system. Words become auditory symbols of the signals of the first system, "signals of signals"; thought acquires a more logical, abstract character, losing its primitive imagistic character. The more highly evolved (developed) the system of verbal signals, the greater is the extent to which the first signal system, of earlier origin, is suppressed, inhibited, and forced into the background.

What happens during sleep? The second signal system, a structure of more recent origin, is less stable and is inhibited first with the onset of sleep. As a result, the first signal system is easily freed of its influence and imagistic thought, with its vividness and unrestrained fantasy, acquires independent significance. The sleeper assumes the most improbable, unrealizable dreams to be proper and real; only on waking do we begin to wonder at our gullibility during the hours of sleep.

In dreams impressions of reality often appear in sharply altered, even distorted forms. This is explained by the so-called hypnotic phases discovered by Pavlov's colleagues. These phases appear during the transition from waking to sleep and from sleep to waking. Of particular importance among them is the "paradoxical" phase, which is noteworthy for the fact that, while it is taking place, weak external and internal stimuli have a considerably greater effect on the brain, and hence the psyche, than do strong stimuli. In the same manner, traces left in the cortex by weak impressions are experienced in exaggerated form during this phase of sleep, while traces of strong impressions are

experienced in diminished form. As a result, for example, faint sounds may seem deafening to a sleeper, while loud sounds seem scarcely audible. Images of small objects may take on gigantic dimensions in dreams, while images of objects that are actually large may seem negligible in size.

The path taken by man in studying sleep and dreams thus extends over many centuries, from animistic beliefs to the precise experiments of Pavlov. We cannot help but emphasize that the discovery of the physiological mechanism of sleep and dreaming is greatly to the credit of advanced Soviet science, whose materialistic character was the principal reason for its success.

It would seem that all incorrect ideas about dreams should long ago have been relegated to history, but they nevertheless make themselves felt even among educated persons not sufficiently familiar with the advances of modern natural science.

Individuals who have not given up their superstitions are particularly subject to fantastic dreams. Quite often, after a dream, we ask ourselves: "Why have I dreamed this? Nothing of this sort exists in reality. I have never heard, read, or thought of anything like it!" Why do dreams so often bear absolutely no relationship to anything comprehensible from our own personal experience? This is a complex question, but science can give a complete explanation of this phenomenon.

First, we may dream of something that has escaped our waking attention. In substantiating this the French scientist Yves Deliage cites the following case. The stairway to his apartment was decorated with a glass ball, which broke and had not been replaced for quite some time. Deliage dreamed that a copper ornament in the form of a fir cone had been substituted for the glass ball. In the morning he mentioned this to his family and, to his extreme amazement, learned that the

broken ball had been replaced with such a copper cone a few days before. Deliage had undoubtedly seen it a number of times without noticing it, since it was very accurately depicted in his dream; then, going out onto the stairway, he made certain with his own eyes that this ornament was present.*

Secondly, impressions that were remembered at the time and then completely forgotten, such as the events of one's childhood, may be recalled in dreams. When such unnoticed or forgotten images appear in a dream we do not recognize them: they seem to be alien, called up by some mysterious force. This is true to an even greater extent of dream images that result from "consolidation" of several impressions pertaining to different periods of the individual's life. For example, one investigator of dreams dreamed of an acquaintance as being of very short stature (not long before he had encountered a dwarf on the street) and having bulging eyes, like a Japanese idol (which he had seen in an antique shop). A fantastic image, which never existed in reality, was thus produced.

I. M. Sechenov very aptly expressed this characteristic of dreams in the following words: "A dream is an often fantastic combination of past impressions." For the same reason Pavlov wrote: "A dream is ordinarily a chain of diverse and contrasting after-stimuli."**

It must be remembered once and for all that no matter how fanciful, incomprehensible, and mysterious dreams may seem to us, they always contain only that which has been consciously or unconsciously perceived in the waking state. A dream consists of no more than capriciously intertwined snatches or traces of past experience, that which we have seen, heard, thought of, or read about, reworked by the partially waking brain.

This basic premise of the theory of dreams is often disputed by

those who still wish to see something mysterious in them. Why then, they ask, do we often fly in our dreams? None of us has flown in real life. The answer to this question lies in the fact that we have all observed the flight of birds, butterflies, and bats and, during our dreams, transfer this experience to ourselves. The conditions under which such dreams arise are known. They develop when the sleeper's breathing is in some way hampered and then becomes free and easy once more. Experimentation has shown that if a sleeper's head is covered with a blanket, which is then removed, he often reports that he dreamed of flying. Another "strange" dream, that of falling into an abyss, is just as simply explained. An individual falls asleep with his legs bent at the knees; if his legs are quickly straightened he dreams that he is falling. The same phenomenon takes place when the sleeper unconsciously moves his legs in this manner.

A mystical significance is often attributed to so-called "creative dreams." It is well known that many noted persons have dreamed the solutions to problems on which they had labored unsuccessfully while awake. Certain mathematical problems have been solved in this way. The German chemist F. Kekoule saw the structural formula of a complex chemical, benzene, in a dream. Wolther dreamed a new version of his poem "Henriad." The Italian composer Tartini wrote some of his sonatas after having heard them performed by someone else in his dreams. The German physiologist K. Burdach, V.M. Bekhterev, and many other scientists have reported that new ideas came to them in dreams. Such cases do not in themselves entail anything unusual. They merely show that the sleep of persons engaged in creative work is often incomplete: those areas of the cortex that function intensively during the day are not inhibited in sleep, remaining excited and continuing to function during the night.

Many persons still regard the apparently prophetic, oracular char-

acter of dreams as their most mysterious aspect. We have already cited several "diagnostic" dreams that foreshadow illness and we were satisfied that they contain nothing oracular. Such dreams, however, are quite rare. Almost everyone dreams, sometimes having many dreams in a single night. During the course of a week or a month each of us has tens, if not hundreds of dreams. Do many of them come true? The answer is naturally no. Dreams do not as a rule come true and it is only exceptionally that they more or less correspond to future events. According to probability theory, since we have many dreams and witness many events some must inevitably coincide. There is nothing surprising in this, but the superstitious person has so narrow a view that he assigns greater significance to the rare coincidences than to the usual lack of correspondence. If we feel that a dream somehow resembles an event that comes to pass a day or two, a week, or a month later, we become uneasy and speak of it as something miraculous, naively losing sight of the fact that tens and hundreds of other dreams bore no relation whatsoever to the events of our lives.

A belief in the prophetic meaning of dreams is one of the most persistent illusions in the human mind. It is reinforced by still another circumstance. It has long been noted that dreams are often filled with obvious or repressed inclinations and desires. A child is attracted by piles of candy in the window of a shop, but his mother refuses to grant his request. In the evening he has difficulty falling asleep, still remembering his unsatisfied desire, and during the night it is finally fulfilled in a dream: the child sees himself in the shop and takes as much candy as he wishes. The same thing often happens with adults: while trying to achieve a cherished desire we see it as already satisfied in a dream; when, after much effort, we are finally able to achieve it, we recall our dream and are astounded, declaring it to be

"prophetic."

The Austrian psychiatrist Sigmund Freud was much occupied with the psychological analysis of dreams. According to the data presented in his voluminous work "Tolkovaniye snovideniy" [The Interpretation of Dreams], many dreams are produced by sensual inclinations, unsatisfied or unsatisfiable, prohibited desires and the highly volitional images, predominantly of a sexual character, associated with them, which are repressed, "displaced" from consciousness into the "subconscious realm." We know nothing of these "forgotten" experiences, but they nevertheless continue to influence our behavior and attitudes and may cause groundless fears, anxiety, etc. It is only in dreams that such "intrusive complexes," groups of repressed images and feelings, again and again rise from the depths of the subconscious in order to gradually spend themselves in a cryptic, symbolic form. Despite the idealistic trend of Freud's theoretical views, which are unacceptable to us, his empirical investigation of dreams apparantly contains a grain of truth. The Soviet psychiatrist I.A. Perepel'* made a noteworthy attempt to translate Freud's psychological ideas into the language of the contemporary physiology of higher nervous activity. Such attempts are still being made.**

No one can now deny the existence of unconscious and subconscious psychic phenomena. Philosophers who refute Freud's theory from the standpoint of dialectical materialism write, for example: "In one thing Freud was right: there is an unconscious. It exists, is active, and influences consciousness, although not in the form of "purely physiological" temporary neural pathways that were previously inhibited. It is actually the living, complete sense of a region whose effect each of us feels. That which we know but do not at present remember has a definite meaningful content, which in principle does not reduce to excita-

tion and inhibition of cortical cells."*

Dreams are either assigned extremely great importance or, conversely, are declared to be lacking in significance and interest. Both these extreme views are incorrect. Dreams can have a noticeable influence on our attitudes during the course of the following day. This is especially true of nightmares, which leave their emotional imprint on the diurnal activity of healthy persons and, to an even greater extent, the sick (neuropaths). In noting these facts in his book, Prof. F. P. Mayorov** rested on the authority of V.M. Bekhterev, who asserted that dreams can influence our attitudes "like an unusual type of suggestion." As we have seen, it cannot be denied that dreams have a certain diagnostic value. In this connection M.I. Astvatsaturov, one of the most noted Soviet neuropathologists, wrote:

"It can, for example, be acknowledged that troubled dreams involving a fear of death and combined with sudden awakening can lead one to suspect a cardiac disorder during that period in which no other subjective complaints indicating such a disorder are present."**

Parapsychologists do not agree with the assertion that a sleeper's dreams can contain only fragments and traces of his own everyday experience, only that which he has seen or heard or of which he has thought or read. Recognizing the existence of telepathic and telesthetic phenomena, they assume that certain dreams may be explained by parapsychic faculties, which are intensified during natural and hypnotic sleep.

In order to avoid repetition I refer the reader to my book "Vnusheniye na rasstoyanii" [Suggestion At a Distance];*** in which I described a number of dreams assumed to be "telepathic" by parapsychologists. Here I will limit myself to a single example of a seemingly telesthetic (clairvoyant) dream, taken from a monograph by C. Richet.****

In the city of Havre there lived a neurological patient noted for

her parapsychic abilities, Leonia B, with whom Dr. Giber, Prof. Janet, and Prof. Richet performed many experiments. On one occasion, when Richet and Giber were in Paris, Janet induced a hypnotic trance in Leonia and suggested that, in her dream, she go to Paris in order to see Richet and Giber. Suddenly the subject exclaimed "There is a fire there." Janet tried to calm her, but she repeated over and over: "I assure you, Monsieur, that there is a fire there." Actually, as Janet learned some time later, on the same day, 15 November, at 6 AM, Prof. Richet's laboratory was destroyed by fire. Janet hypnotized Leonia at 5 PM on the same day, when no one in Havre, including Janet, could have known of the fire.*

A similar (and perhaps more significant) incident occurred with the same subject, but while she was awake. One evening, after several unsuccessful experiments in the mental suggestion of numbers and playing cards, Richet asked Leonia the question:

"What is happening to M. Langula (the head of the laboratory at which Richet had worked when young)?"

She very quickly answered:

"He has burned his hand. Why was he so careless in pouring it?"

"In pouring what?"

"A red liquid in a small bottle... his skin blistered immediately."

"It could not have been expressed more accurately," writes Richet. It turned out that two hours before, in conducting a chemical experiment in the laboratory, Langula imprudently poured some bromine into a flask in great haste. This "red liquid" spilled onto his hand and forearm, where it immediately raised a rather large blister. Leonia had not had access to the laboratory and Richet had had no visitors from the laboratory after the accident.

In such cases we cannot exclude the possibility of a fortuitous

coincidence of two events having no connection at all. They consequently cannot in themselves serve as sufficient proof of the existence of telepathic and clairvoyant perceptions or dreams. Reports of this sort of occurrence are of serious significance only if telepathic and telesthetic phenomena can be shown to exist by repeatable experiments, which we will discuss in Chapters 6 and 7.

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[Footnotes]

10* N. Ye. Vvedenskiy, Polnoye sobraniye sochineniy [Complete Works], Vol. 5, Leningrad, 1954, page 337.

10** H. Nudow, Versuch einer Theorie des Schlafs [Testing a Theory of Sleep], Koenigsberg, 1791.

10*** A. Mori, Son i snovideniya [Sleep and Dreams], Moscow, 1867.

11 Until recently there were no doubts regarding such cases of accelerated psychic activity during sleep. Investigations by American psychologists at the University of Chicago have established, however, that while a sleeper is dreaming his cerebral biocurrents take on the same form as when he is awake and his eyeballs make rapid movements beneath his closed eyelids. This phenomenon lasts as long as the dream, an average of 9 minutes and sometimes considerably longer. It has been found that "the action observed in the dream lasts precisely as long as it would were it performed in the waking state" (see the journal "Tekhnika – molodezhi" [Young Engineer], 1962, No. 9, page 33).

14 B. Oks, Fiziologiya sna i snovideniy [Physiology of Sleep and Dreaming], Odessa, 1880, page 78.

17 B. N. Birman, Eksperimental'nyy son [Experimental Sleep], Leningrad, Gosizdat, 1925.

21* See A. Lemann, Illyustrirovannaya istoriya suyeveriy i volshebstva ot drevnosti do nashikh dney [Illystrated History of Superstition and Magic from Antiquity to the Present], Moscow, 1900, page 469.

21** Cited by F. P. Mayorov, Fiziologicheskaya teoriya snovideniy [Physiological Theory of Dreams], Moscow-Leningrad, Izd. AN SSSR, 1951, page 39.

24* See I. A. Perepel', Psikhoanaliz i fiziologicheskaya teoriya

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poveneniya [Psychoanalysis and the Physiological Theory of Behaviour], Leningrad, 1928.

24** See E. Sh. Ayrapet'yants and K. M. Bykov, Ucheniye ob interotseptsii i psikhologiya podsoznatel'nogo [Theory of interoception and the psychology of the subconscious], Uspekhi sovremennoy biologii [Advances in Modern Biology], Vol. XV, 1942, page 273; G. Wells, Pavlov i Freyd [Pavlov and Freud], Moscow, IL, 1959.

25* F. Mikhaylov and G. Tsaregorodtsev, Za porogom soznaniya (Kriticheskiy ocherk freydizma) [Beyond the Frontier of Consciousness (a Critical Review of Freudianism)], Gospolitizdat, 1961, page 45. Emphasized by the authors.

25** See F. P. Mayorov, Fiziologicheskaya teoriya snovideniy [Physiological Theory of Dreams], page 122.

25*** Sovetskaya vrachebnaya gazeta [Soviet Medical Gazette], 1939, No. 1, page 10.

25**** L. L. Vasil'yev, Vnusheniye na rasstoyanii (Zametki fiziologa) [Suggestion at a Distance (A Physiologist's Notes)], Gospolitizdat, 1962. See Chapter II, "Cases from Everyday Live Assumed to be Suggestion at a Distance."

25***** Ch. Richet, Traite de Metapsychique [Treatise on Metapsychology], Paris, 1923, page 153.

26 This occurred during the middle eighteen-eighties, when communications between cities were still poor.

## 3. HYPNOSIS AND SUGGESTION

Of all the neuropsychological phenomena that have long caused and still cause superstitious ideas, nocturnal sleep and dreams are the most commonplace. Other types of sleep and twilight states of consciousness are less frequently encountered, appearing principally in hysterical patients. They include lethargy, or deep pathological (morbid) sleep, which may continue uninterrupted for several days and sometimes for as long as a week. In this case both voluntary movements and simple reflexes are so depressed and physiological control of the respiratory and circulatory organs is so greatly reduced that someone unfamiliar with medicine may assume the sleeper to be dead.

The fear of being buried alive was especially strong during the 18th century and at the beginning of the 19th century. The book "Nastavleniye k popecheniyu o mertvykh" [Instructions for the Care of the Dead], compiled by the physician Thiery, was in vogue. In this unique document we read the lines: "Since there have been examples of hysterical women who have apparently died and then revived after as long as six days... it is helpful to build a morgue at every cemetery. Overseers should examine the bodies several times each day. Each corpse should be left on a pallet, covered with a blanket, and its nose, mouth, and eyes should be kept open. Fresh air ought to be frequently admitted to the room... the room should be fumigated with vinegar, pouring it onto heated stones, since acidic fumes are beneficial to both corpses and healthy persons and electrization of the body has a better effect when they are present... it is obvious that this would be the best precaution against

premature burial."* As we can see, attempts were already being made to establish whether a person was dead or had fallen into a lethargic sleep by use of electric current, which had been produced not long before by the Italian physicist A. Volta, with the aid of the so-called "voltaic tile."

Let us cite a typical case of lethargic sleep. "Doctor Rosenthal, in Vienna, published a description of a case of trance in a hysteric woman, who was pronounced dead by her physician. When Rosenthal saw her, her skin was pale and cold, her pupils were contracted and insensitive to light, her pulse was indetectable, and her extremities were relaxed. He dropped molten sealing wax on her skin, but could not observe the slightest movement in response. A mirror was held to her mouth, but no traces of moisture were detected. It was impossible to distinguish the slightest respiratory sound, but auscultation revealed a barely perceptible intermittent sound in the cardiac region. The patient had been in this apparently lifeless state for 36 hours. Using direct current, Rosenthal found that the muscles of the face and extremities were contracted. The patient recovered after faradization for 12 hours. Two years later she was alive and well and told Rosenthal that she was not aware of anything at the beginning of her seizure; she later heard talk about her death, but could do nothing to help herself."**

The American writer Edgar Poe, who depicted various powers in his work, assembled a whole collection of stories of "premature burial." It is possible that such tragedies occasionally occurred in olden times and made a tremendous impression on superstitious persons. It was this that in all probability gave rise to one of the most dismal and absurd of all notions, the belief in vampires, persons who had died a "false death" and who left their graves and crypts by night in order to sustain their half-living, half-dead existence with the blood of tne liv-

ing.

Various forms of protracted sleep, sometimes lasting for many years, have now been thoroughly studied and the superstitions associated with them have been relegated to the realm of legend. Below are two noteworthy examples of prolonged sleep.


"A yoga's sleep" – autohypnosis induced by autosuggestion and similar to lethargy. (from a rare photograph.)

In France a four-year-old girl with a nervous disorder became frightened and fell into a faint, which deepened into a lethargic coma that lasted for 18 years without interruption. She was admitted to a hospital, where she was carefully nursed and fed, so that she grew to maturity. Although she awoke an adult, her mind, interests, and feelings were the same as before her years of sleep commenced. Thus, on awaking from her lethargy, she asked to play with a doll.* I.P. Pavlov reported a case of still more prolonged sleep. A clinic patient remained a "living corpse" for 25 years. He did not make a single movement or speak a single word between the ages of thirty-five and sixty, when he gradually began to display normal motor activity, to stand, to speak, etc. The old man was asked what he had felt during the long years when he lay a "living corpse." It was ascertained that he had heard, seen, and comprehended much, but could not move or speak. Pavlov

attributed this case to persistent pathological inhibition of the motor area of the cerebral cortex. In old age, when the inhibitory processes weakened, the cortical inhibition was reduced and the patient awoke.*

There have been reports by European travelers and Indian writers to the effect that Indian yogis, using the methods of autohypnosis and respiratory arrest known to them, can at will induce a state of profound, prolcnged sleep similar to lethargy or catalepsy. L. Levenfel'd devotes an entire chapter of his book "Gipnotizm" [Hypnotism] to this problem.

He reports that, in his dissertation of 1893, H. Walter translated from the Sanskrit an ancient Indian manuscript dealing with the exercises through which yogis induced protracted sleep. These consist principally in holding the breath for gradually increasing intervals, so that temporary cessation of conscious activity ultimately occurs. At the same time, the yogi adopts a comfortable position and, with his head bowed and his eyes half open, "directs his gaze at a point between his eyebrows," closes his nose, mouth, and ears (or has them covered), and "listens intently to his inner voice," which resembles the tone of a bell, the roar of a shell, the note of a trumpet, or the buzzing of a bee. All these techniques supposedly lead to profound autohypnosis similar to lethargy, the "apparent death of hysteric patients."

This problem greatly interested Academician I.R. Tarkhanov. In his book "Dukh i telo" [Mind and Body], which is still of much interest, he writes that some Europeans have been able to induce a state somewhat, albeit very little, resembling the sleep of yogis; the chief difference lay in the fact that they attempted to retard their heart rate rather than their respiratory rate through the exercise of will power. Tarkhanov gives the following account of this problem.

"However, difficult it may be to imagine that the heart and blood

vessels can be made to obey the will, like any skeletal muscle, the medical literature nevertheless describes cases that apparently show this phenomenon to be possible. Thus, Bell (an English physiologist – Author) could substantially reduce his heart rate at will... Chermak (also a noted physiologist – Author) was able to retard or stop his heart. Finally, the literature mentioned an Englishman, Colonel Townsend, who could voluntarily arrest his heart for so long a period that he passed into syncope; after several hours in this state he gradually regained consciousness (like a yogi – Author). For a long time such sessions passed without incident, but one evening, after conducting an experiment of this sort before numerous witnesses, he died."*

As we know, surgery now makes extensive use of hypothermia, which involves gradual cooling of the patient's body to the point at which he passes into a state similar to the hibernation of certain animals, e.g., marmots, bats, etc.**

Another type of pathological sleep, referred to as lunatism, sleepwalking, or natural somnambulism, has long been known. A healthy person can dream that he is going somewhere or performing some sort of work while actually remaining immobile. A sleepwalker, still dreaming, leaves his bed and goes for a walk or automatically performs the action about which he is dreaming. Having done this, he returns to bed and sleeps soundly until morning; on waking he remembers nothing of his nocturnal adventures. Here it is sufficient to consider the case of an educated person who suffered from somnambulism:

"One night he was occupied with a translation from Italian to French; he searched in the dictionary and found a word, behaving as though he were using the light of a row of candles. When the candles went out he felt for them and relit them. It was totally unnecessary to do so, since the room was illuminated by other candles, which he did

not notice because he did not know that they were lit."*

Natural somnambulism, which is not infrequently encountered, is perhaps one of the factors responsible for the ancient belief in the existence of household "spirits," or "brownies." During the night, when everyone in the house is asleep, these benevolent "spirits" perform various household tasks that their host did not have time to complete during the day. In actuality, this is done by some member of the family who suffers from somnambulism.

In addition to somnambulists who continue their usual activities while asleep, there are those who perform unusual actions, of which they are incapable when awake. The prominent Russian biologist I.I. Mechnikov was interested in such cases. He described the following example:

A nurse admitted a 24-year-old female hysteric, who proved to be a somnambulist, to a Paris hospital. One night the physician on duty observed the following scene.

The patient rose from her bed and climbed to the top floor, to the ward in which she had previously slept. "On reaching the upper landing of the staircase, she opened a window giving onto the roof, stepped through it, and walked along a ledge under the eyes of a nurse, who followed her in horror but did not dare to speak to her; she climbed back in through another window and descended the staircase. When we saw her she was walking noiselessly, her movements were automatic, and her hands were somewhat inclined to her torso; she held her head straight and immobile, her hair was loose and flowing, and her eyes were wide open. She resembled some fantastic ghost."**

In Mechnikov's opinion, cases of this type "adequately demonstrate that, during natural somnambulism, the individual acquires abilities that he does not have in the normal state and becomes a strong, nimble, accomplished gymnast, greatly resembling his anthropoid ancestors...


Somnambulistic woman. (from a painting by the artist G. Pioc.)

man has inherited from his ancestors many cerebral mechanisms whose activity was suppressed by more recently evolved restraint."* In the somnambulistic state these ancient cerebral mechanisms are more or less deinhibited as a result of inhibition of the more recently evolved, truly human regions of the cortex. "Consequently," concludes Mechnikov, "we can assume that the gymnastic feats and startling strength of somnambulists are a reversion to the animal state,"** to instinctive manifestations of the climbing animals who were man's closest ancestors.

Mechnikov's hypothesis obviously has something in common with Pavlov's view of dreams, which was presented above: during sleep, inhibition of the highest, genetically most recent cortical functions results in deinhibition of a more primitive type of association, so-called objective or imagistic thought, while in somnambulistic sleep it is older motor automatisms, supposedly lacking in modern man, that are deinhibited.

In rare cases the somnambulistic state may last for weeks or months, the individual then returning to his normal state. A startling phenomenon is observed in such cases: the consciousness splits into a primary, normal component and a secondary, somnambulistic component. The following is a noteworthy example of this condition.

A daughter named Felida was born to healthy parents. At the age of 13 she exhibited the first symptoms of hysteria and, a year and a half later, began to have seizures of hysterical somnambulism. These became less frequent as time passed, but the secondary, somnambulistic psychic

state persisted for protracted periods. When she was 32 years of age this state appeared for approximately three months, being interrupted by the normal, primary state only for periods of a few hours. Her secondary, or somnambulistic personality had a good memory of the events of both states, but her primary, or normal personality could not remember what she had done in her somnambulistic state. Her brief flashes of normality were consequently very unpleasant for Felida. Her secondary personality was easier to live with than her primary personality and this was reflected in her character. During her normal periods she was melancholic, withdrawn, and taciturn, constantly complained of pain, and was occupied exclusively with herself, paying little attention to her surroundings. In her somnambulistic state she was gay and lighthearted, did not like to work, and spent a great deal of time at her toilette; on the other hand, she displayed much affection and kindness toward children and her relatives. Two psychic personalities thus undoubtedly existed in a single individual.*

Severe changes in personality sometimes occur suddenly, as a result of some violent mental shock. The noted French psychologist A. Binet described the following typical case. A young man, sixteen years of age, worked in a vineyard; one day, while at work, he stumbled upon a snake and became so frightened that he fainted. When he regained consciousness his feet were found to be paralyzed and profound changes were detected in his psyche: he imagined himself to be a nine-year-old boy and behaved in all respects like a child of this age. The entire latter half of his life was forgotten and the vital experience he had acquired during this period was obliterated. He read poorly, wrote like a beginner, and displayed the impressions and interests of a nine-year-old. As a result of the paralysis of his legs, the young man left the vineyard and went to work in a taylor shop. There he was taught to

sew, again learned to read, and devoted himself to tayloring. Several years later he experienced another severe shock, which caused prolonged syncope. When he regained consciousness this time the paralysis had disappeared and his memory of the forgotten half of his life and of his work in the vineyard prior to his encounter with the snake had returned. However, he was found to have forgotten everything about his life in the taylor shop and all his knowledge and skill in tayloring.

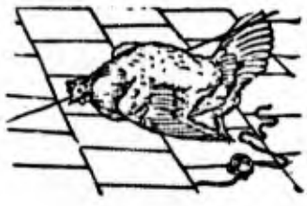
In his lectures N.Ye. Vvedenskiy pointed out that such conditions, in which the individual appears to shift from one personality to another, were depicted with great artistic force in many of the works of Dostoyevskiy, this great writer and psychologist having been deeply interested in states of this type. We can first note the amusing introspections of the impoverished counselor of state Pralinskiy, who unexpectedly became drunk at the wedding supper of one of his subordinates, as recounted in the story "Skvernyy anekdot" [A Bad Joke]; then there are a number of scenes and incidents in "Vechnyy muzh[ [The Eternal Husband]; finally, we have the development of a total split in personality in M. Golyadkin in "Dvoynik" [The Double] and in Ivan Fedorovich in "Brat'ya Karamazovy" [The Brothers Karamazov]. These examples from Dostoyevskiy's works show that personality splits of varying extent are not infrequently encountered in the everyday life of persons considered to be healthy.

At the time, when nervous and mental illnesses were still a complete mystery, such phenomena were regarded as "possession," as the periodic taking over of the patient's body by an alien personality, usually some restless soul who has not found a place in the next world. This preposterous belief has apparently long been relegated to the realm of legend, but during the 19th century it flourished in the form of so-called spiritualism. The heroes of spiritualistic seances were

mediums, who were convinced of the existence of spirits and served as intermediaries between living persons and the souls of the dead. During a seance the medium goes into a trance (a type of pathological sleep) and speaks, writes, and acts in the name of the "spirit" that "controls" him, usually the "spirit" of some famous deceased person or of a dead relative of one of the individuals present. If the medium is not simply a fraud (as is usually the case) he is ill, suffering from an unusual type of personality split; the entire set of mysterious circumstances surrounding a seance produces an attack of this ailment.*

The "mysteriousness" of these truly startling phenomena and many others like them was dispelled after scientists learned how to reproduce them artificially in experiments on neurological patients and completely healthy persons, utilizing hypnosis and suggestion.

Induction of an hypnotic trance in a Greek temple.



The "wondrous experiment" of Athanasia Kircher (from an old engraving).

We can distinguish three phases in the history of hypnotism. The first is hidden in the mists of antiquity. Hypnotic trances were undoubtedly known to the priest of Egypt and Greece. This is indicated, for example, by the so-called "Gnostic Papyrus" (2nd century A.D.), which des-

cribes techniques of hypnotism still used at present. Ancient priests employed hypnosis for religious purposes. They usually posed questions to a young temple attendant in whom a hypnotic trance had been induced; his answers were regarded as instructions from the gods, as prophecies. Hypnosis was also used for therapeutic purposes in Ancient Greece. This is shown by information on the life and activities of the noted ancient physician Asclepiades, which has come down to the present day.

The scanty knowledge of the ancients regarding hypnotic sleep and methods of hypnotism was lost during the Middle Ages. It was only during the Renaissance that science again turned its attention to hypnotic phenomena, at first in experiments on animals. This, during the first half of the 17th century there appeared reports by the German scientist Schwenter and Kircher on a "bewitched chicken," or a "wondrous experiment." It was found that it is sufficient to hold a chicken firmly in the hands, carefully pressing its head against the floor and keeping it in this position for some time, to induce a state of immobility and relaxation resembling deep sleep, from which it can be aroused only by a sharp blow or a loud noise.

In attempting to explain such phenomena the scientists of the time formulated the fantastic theory characteristic of the second phase of the history of hypnotism, which is known as the doctrine of animal magnetism.

The famous Swiss physician T. Paracelsus and his followers, J. van Helmont and R. Fludd, asserted that one individual could influence the body and psyche of another through a mysterious "vital force," which flowed from the hands, eyes, and other bodily organs. This assumed force, or emanation, was at first called fluid. It was later contended that fluid had an effect on living beings similar to that of an ordinary magnet, to which curative properties were attributed at the time. It was

consequently renamed "animal magnetism" and persons having the ability to transmit their healing magnetism to patients came to be called magnetizers.

During the second half of the 18th century this far from valid theory was clearly formulated and disseminated by the Viennese physician A. Mesmer, who, with little justification, is considered the founder of hypnotism. Using various techniques that acted on the imagination, such as passing his hands over the patient's body, supposedly in order to communicate his magnetism (so-called hypnotic passes), Mesmer induced a state of "crisis," a hysterical seizure manifested in twitching, convulsions, piercing screams, and unrestrained laughter or weeping. According to his "theory," any nervous ailment must be brought artificially to a climax in order that it can be cured. Mesmer's assistants moved violent "crisis" patients to a "crisis chamber," a room furnished with carpets and quilts, where, left to themselves, they sometimes actually recovered from their illnesses.

In 1774 a commission was established in Paris to investigate animal magnetism. It included famous scientists from the medical faculty of the University of Paris and the Academy of Sciences and was headed by B. Franklin and A. Lavoisier. The commission made a thorough study of the therapeutic activity of A. Mesmer and his successor, Deslon, and conducted a series of brilliantly conceived experiments in order to resolve the question of the "animal-magnetic fluid." These experiments conclusively disproved the existence of such a fluid, but they also led to an important discovery, showing how great a physiological effect the excited imagination can have. The commission attributed everything that Mesmer and his successor had ascribed to the influence of the magnetic fluid to the action of the imagination (this term was later replaced by the expressions "suggestion" and "autosuggestion," which are more to



Mesmer magnetizes patients by means of magnetized water poured into a large tub (from a painting by the artist O. Renard).

the point). The following is an excerpt from the conclusions reached by this commission, which played an important role in the struggle against superstition.

"The commission, having acknowledged that the animal-magnetic fluid is not accessible to any of our five senses and that it did not have the slightest effect on any of our members or on the patients whom we exposed to it and having proved through positive experiments that imagination without magnetism can produce convulsions, while magnetism without imagination cannot, we have unanimously reached the fol-

lowing conclusions regarding the existence and benefits of magnetism: nothing has proven the existence of an animal-magnetic fluid; this non-existent substance consequently cannot be of benefit; the morbid effects observed during public treatment result from the operator's touch, an excited imagination, and mechanical imitativeness, which forces us to repeat involuntarily that which affects us."*

The great power attributed to the imagination by Lavoisier is evident from the following statement: "We encounter the action of magnetism or, better, of the imagination in the theatre, in war, in popular disorders, and in the mass gatherings at therapeutic baths (those of Mesmer); hence this power is active and frightening, its manifestations causing consternation, while its source is still hidden and mysterious."**

The history of science does not, however, give Mesmer credit for the rediscovery of the hypnotic trance. This honor falls to his pupil and disciple M. Puisegur. One of the histories of mesmerism describes this accidental discovery in the following manner:

"Being possessed of a dilatantish humanism and a philosophical curiosity, he uses his estate to give free magnetic treatments in accordance with his patron's instructions. A whole group of persons seeking aid come to him at once and the philanthropic Count attempts to induce in them crises as violent as possible. But suddenly he is dumbfounded and even frightened. Instead of responding to his magnetic passes with twitching, convulsions, and fits, a young herdsman by the name of Victor simply exhibits fatigue and peacefully falls asleep under his hands. Since this behavior contradicts the rule that the magnetizer must first induce convulsion and not sleep, Puisegur tries to rouse the lout, but in vain. Puisegur shouts at him, but he does not move. He shakes him, but the stocky lad is amazingly in a totally different, ab-

normal sort of sleep. Suddenly, when the Count again orders him to get up the lad actually arises and takes a few steps, but with his eyes closed. Despite the fact that he cannot see, he behaves as though he were awake, as though he had all his senses and yet were still asleep. In broad daylight he has fallen into somnambulism and begun to wander in his sleep. The confused Puisegur tries to speak to him, asking him questions. What is this? Still asleep, the peasant lad answers each question quite reasonably and clearly. Puisegur, troubled by this unique phenomenon, repeats the experiment. He actually is able to use magnetic methods to induce this state of waking while asleep, of sleeping while awake in both the young peasant and a whole series of other persons. Puisegur, greatly excited by his unexpected discovery, continues his experiments with redoubled zeal. He gives so-called posthypnotic suggestions, i.e., instructs the sleeper to perform definite actions after he awakes. On regaining their normal state of consciousness, the patients actually do that which was suggested to them while they were asleep."*

Being able to throw their patients into a hypnotic trance and having learned to artificially induce fits of somnambulism, Mesmer's followers placed a totally incorrect interpretation on these phenomena. At the time European science still knew nothing of suggestion, which proved to be the factor that leads to the hypnotic state. It was only at the beginning of the 19th century that the Portuguese abbot Faria, who had lived for many years in India, where hypnotic phenomena were known from ancient times, began to demonstrate in Europe experiments involving verbal hypnotism without passes and thus without any imaginary magnetic fluid to affect the subject. During the 1840's the English surgeon J. Bred perfected a method of verbal hypnosis and supplemented it with the auxiliary technique of instructing the subject to fix his

gaze on some shiny object (fixation fatigues the subject's eyes and thus promotes verbal trance induction).

GRAPHIC NOT REPRODUCIBLE

Historic demonstrations of hypnotic phenomena by Karl Hansen (from an old engraving). Explanation in text.

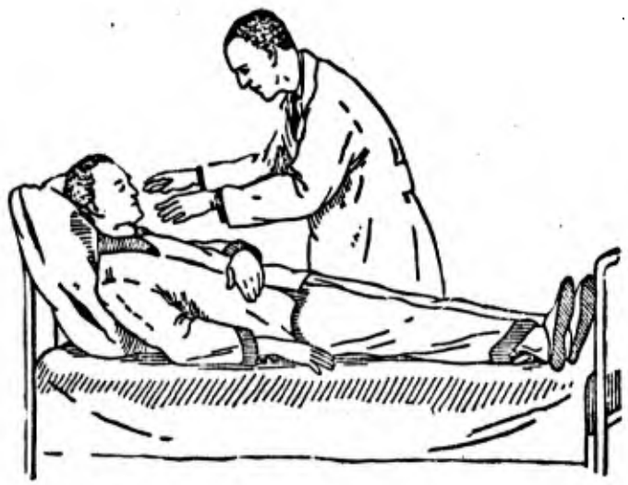
It must be noted that Bred took a skeptical attitude toward mesmerism. On one occasion, intending to expose the hoaxes, as he then supposed them to be, perpetrated by the Swiss magnetist La Fontaine, Bred became convinced of the authenticity of the hypnotic phenomena demonstrated by La Fontaine and began to study them. He conclusively refuted the "magnetic-fluid theory" and replaced the term "animal magnetism" with the modern term "hypnotism" (from the Greek word "hypnos," meaning sleep). Finally, Bred was the first to use the hypnotic trance as a means of anesthesia for surgical operations. All this justifies our regarding Bred as the true founder of the third, fully scientific

trend in the development of hypnotism.

The investigations of this English physician did not find favor with his contemporaries. Hypnosis and therapy by means of words seemed no less alien to them than hypnosis and therapy by means of magnetic fluid. Bred's verbal suggestions reminded his scientific colleagues of the magical incantations of olden times. The next task was to convince contemporary scientists that the act of suggestion, i.e., acting on the individual's neuropsychological state by means of words, was nothing mysterious or alien. This was accomplished by later researchers, who showed that a notion of a movement can induce this movement against the subject's will. Thus, for example, if one stands behind a fully awake subject and repeatedly tells him that he can scarcely stand on his feet, that he is being pulled backward, he will, if he is sufficiently suggestible, begin to sway more and more and to lose his equilibrium and may ultimately fall over backward. If a suggested idea of some movement leads to involuntary execution of this movement, there is nothing surprising in the fact that an idea of sleep, suggested by a hypnotist, can actually induce sleep. Hypnosis thus proved to be nothing other than suggested sleep induced by the subject's idea of the act of falling asleep.

During the second half of the nineteenth century all these investigations finally paved the way for general recognition of hypnotism and of its value to medicine. The unassuming provincial French physician A. Lebeaux used hypnotherapy extensively and disinterestedly, making no mystery of it. His activity attracted the attention of authoritative medical figures, the French professors I. Bernheim and G. Charcot. More than anyone else, these bold and talented researchers promoted the recognition and propagation of hypnotism. It soon became obvious, however, that there were substantial differences in their views on the nature of

hypnotism. Charcot assumed that deep hypnosis, with all its manifestations, is observed only in hysteric patients and is itself an artificially induced pathological state. Bernheim contraverted this, holding that hypnosis can be induced in completely healthy persons and that it must be likened to natural nocturnal sleep. The founder of hypnology (the special science of hypnosis and suggestion) in Russia was V.M. Bekhterev, who resolved a great deal of the disagreement between Charcot and Bernheim and introduced much that was new into this field of knowledge. However, only I.P. Pavlov, in his theory of higher nervous activity, was able to reveal the physiological bases of hypnotic trance and suggestion.



Verbal trance induction reinforced by passes without contact.

We can assume that I.P. Pavlov developed a deep interest in hypnosis at the very beginning of his scientific activity, during the eighteen-seventies and eighteen-eighties, when he worked as a young man in the laboratory of his esteemed teacher, the distinguished German physiologist R. Heidenhain. Of these years Ivan Petrovich later wrote: "At the time European society was interested in the experiments of the professional hypnotist Hansen. Heidenhain saw these experiments in

Breslau and quickly repeated them himself, so that he was, together with Charcot, one of the first to point out that the field of hypnosis is one of great practical import and scientific importance. He then advanced a hypothesis regarding hypnosis, which he considered to be the result of inhibition of the activity of the higher centers caused by the weak rhythmic stimulation (of the cutaneous nerves of the face, the auditory nerves, or the optic nerves) used to induce the hypnotic state; in work conducted jointly with Bubnov he provided some experimental confirmation for this view..."*

In a pamphlet bearing the old-fashioned title "Zhivotnyy magnetizm"** [Animal Magnetism] Heidenhain described the first strict physiological investigation of hypnotic phenomena, which I.P. Pavlov continued and brilliantly completed many years later.

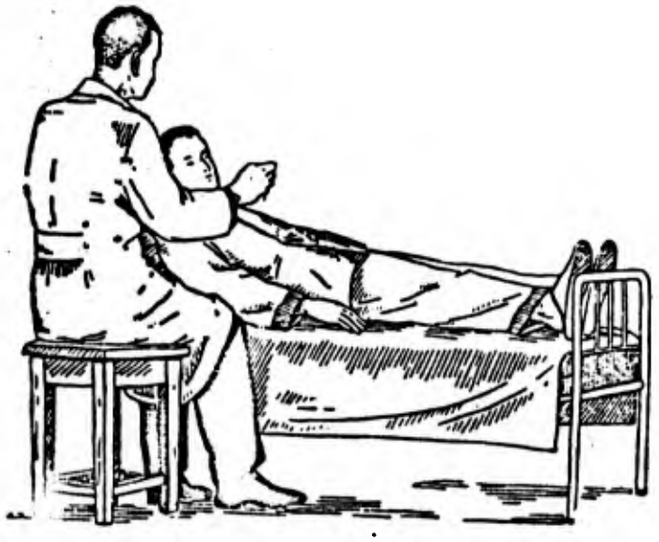
As for the modern method of inducing hypnotic trance, it differs little from the techniques developed by the classical hypnotist – Bred, Charcot, Bernheim, et al. Verbal induction of a soporific state is the principal procedure used for humans. I.P. Pavlov explained the physiological principles of this technique in the following words: "The method (of hypnotism – Author) consistently used at present involves repetition of words (spoken in a flat, monotonous tone) describing the physiological actions of sleep. These words are naturally conditioned stimuli, being strongly associated with sleep in all of us and consequently capable of inducing it."*** The verbal trans-induction technique, which provides a monotonic auditory stimulus acting through both the first and second signal systems, is usually accompanied by other weak, monotonously rhythmic or persistent stimuli. Such stimuli include fixation of the eyes on a shiny object, the sound of a metronome or buzzer, gentle stroking of the skin, or the so-called passes used by the magnetists of old; the latter are repeated motions of the hypnotist's warm

hands in front of the subject's face and along his trunk, without touching his skin, and constitute a very weak massage of the skin by the air-borne heat waves generated during the movement of the hands. "Heat-and-light passes," made with an electric heater or a blue light bulb on a long cord, are now being successfully used in place of manual motions.

Passes made with an electric heater.

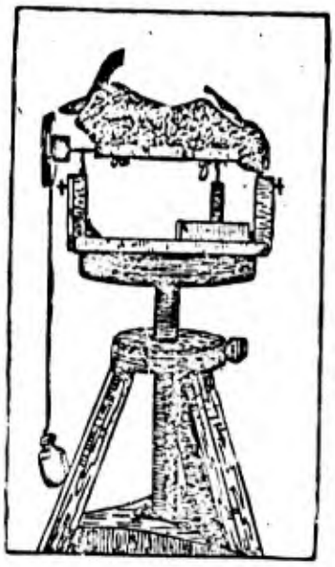
Highly suggestible persons (hysterics, alcoholics, etc.) can be quite quickly thrown into a hypnotic trance by strong, unexpected stimuli. Charcot employed a loud stroke on a gong for this purpose; a sudden flash of bright light, an imperative shout, or the hypnotist's command "Sleep!" can also be used.* The technique used in hypnotizing animals involves momentarily turning them on their backs with the aid of a special apparatus.

What distinguishes hypnosis from normal sleep? The fact that during hypnotism a unique relationship, called an isolated rapport, is established between the hypnotist and his subject.



Verbal trance induction reinforced by fixation of the eyes on a bright object.

What does this mean? During natural sleep the individual does not perceive external influences. His consciousness is isolated from the surrounding world. A subject in a deep hypnotic trance is unaware of where he is, does not react to external stimuli, and does not answer questions asked by onlookers, but he does exhibit an acute perceptivity with respect to everything pertaining to the hypnotist. The hypnotized individual hears only the hypnotist's voice and responds only to him; moreover, each word spoken by the hypnotist evokes unusually vivid ideas in the subject's consciousness and these may become illusions or hallucinations or cause automatic motor acts. If a hypnotized subject is left to himself for a long time his isolated rapport with the hypnotist gradually becomes weaker and may disappear altogether; he no longer reacts to the hypnotist's presence or answers his questions. The disappearance of this rapport marks the transition between the hypnotic state and natural sleep. Actually, the subject awakens by himself after a certain time has elapsed, as though he were awaking from natural sleep.



Prof. Mangold's apparatus for hypnotizing animals.

A mother imparting a suggestion to her child during nocturnal sleep.

A transition in the opposite direction, from natural sleep to a hypnotic trance, can al-

so occur. It is well known that some persons are in the habit of babbling, uttering individual words and entire phrases while asleep. At such times it is occasionally possible to establish verbal contact or rapport with the sleeper by cautiously asking him questions relating to the content of his babbling. As soon as the sleeper begins to answer, the experimenter has accomplished his purpose: natural nocturnal sleep has become hypnosis, with the sleeper as the hypnotic subject and the experimenter as the hypnotist, who can impart suggestions. In some countries this technique is employed by parents, who utilize hypnotic suggestion to break their children of detrimental habits or tendencies.

Essentially the same method has recently come into use for instruction during sleep (natural or induced), a process known as hypnopedia. Just as hypnotherapy, hypnopedia was known to the ancients in rudimentary form, but was neglected and forgotten as time passed. Our contemporaries had to rediscover it. Scientists were at first interested in the possibility of verbally suggesting certain dreams to a sleeper. This proved to be feasible, as was shown by interrogation of subjects after verbal-suggestion sessions (A. Moll, 1898). An individual in normal sleep thus perceives speech addressed to him, although he is not aware of it. In 1922 an attempt was made to teach telegraphic code to sleeping subjects at an American maritime school. During the night certain symbols were repeatedly transmitted through headphones worn by the students, without awakening them. When they awoke in the morning a single repetition of the symbols was sufficient to enable them to repeat correctly the lesson they had learned in their sleep.

The hypnopedic method has gradually developed in other nations, including the Soviet Union (V. Zhukhar and his colleagues, L.A. Bliznichenko, and others). It was found that the memory of a sleeping adult acquires certain of the characteristics of that of a child. The logical

type of memory is dominant in adults, while the mechanical type is dominant in children. Sleeping adults, however, have a substantially greater ability to assimilate educational material that requires mechanical rather than logical memorization, such as foreign words, numbers, codes, ciphers, etc. For example, it has been established that experimental subjects remember and reproduce foreign words 2-3 times better than control subjects who have learned the same words while awake. The period of superficial, shallow sleep that usually begins half an hour after the individual falls asleep has proved to be the most suitable for hypnopedia.*

At this point, however, let us turn to the hypnotic trance. I.P. Pavlov considered hypnosis to be a special type of partial sleep. A restricted area of the cortex, associated with perception of the hypnotist's voice and with comprehension of his verbal suggestions, continues to function, persisting as a "sentry point of excitation." All other cortical regions are inhibited, sometimes even more profoundly than in natural sleep.

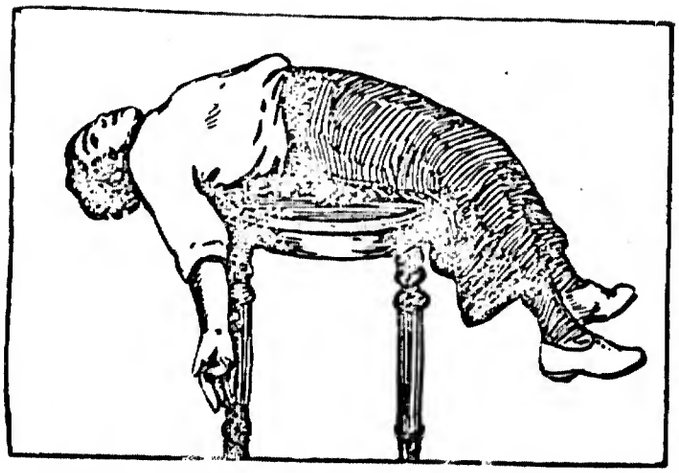
"In addition to a certain degree of cortical inhibition," wrote Pavlov, "which, in accordance with the general law of stimulation, is concentrated in a definite restricted area, the words of someone setting out to hypnotize a given subject naturally induce deep external inhibition... throughout the remainder of the cerebrum and thus exclude any concurrent action by other immediate and past stimulus residues. This accounts for the great, almost irresistible force of suggestion as a stimulus during and even after hypnosis. The hypnotist's words continue to act after hypnosis, remaining independent of and inalterable by other stimuli that were not associated with them when they initially reached the cortex. The ambiguity of words explains the fact that a suggestion can cause a hypnotized subject to perform many differ-

ent actions affecting both the external and internal worlds."*

The word "sleep!" acts on the subject as a hypnogenic (sleep-inducing) conditioned stimulus pertaining to the second signal system; the word "awake!" is a verbal signal that deinhibits the cortex. A similar situation arose in the experiments of B.N.Birman, which were described above: the dog fell asleep on hearing the "inhibitory" tone "mi" and awoke on hearing the stimulatory conditioned stimulus "do." In this case the tone "mi" corresponds to the verbal signal "sleep!" and the tone "do" to the verbal signal "awake!"

There was also another phenomenon which made these experiments resemble hypnosis to an even greater extent. One sight of the experimenter, who had repeatedly put the dog to sleep by sounding "inhibitory" tones on the harmonium, or the mere sound of his voice gradually began to induce a soporific state. As soon as the experimenter entered the room the animal fell asleep. The appearance of other persons who had not participated in the experiments had no soporific effect. The experimenter himself became a hypnogenic stimulus for the experimental animal. Something similar occurs in repeated hypnosis sessions: the subject is hypnotized more rapidly each time. This may be attributable to the fact that the mere sight of the hypnotist in the surroundings where the sessions usually take place has a soporific effect. Hypnosis can be achieved even when the hypnotist is not present: he can be replaced by a phonograph record on which he has recorded a verbal suggestion to sleep. This experiment alone is sufficient to dispel superstitious notions that a hypnotist acts on his subject through some mysterious magnetic force.

In order to hypnotize a given subject it is necessary that he be sufficiently suggestible in the waking state; only when this is the case can the idea of sleep suggested by the hypnotist induce actual



A hypnotized subject in a state of lethargy (from a rare photograph).

sleep. The subject's suggestibility is greatly enhanced when hypnosis takes place and when some degree of isolated rapport is established. Making use of this, the hypnotist sets about giving verbal suggestions, perhaps of a therapeutic character, being convinced that they will work. A subject's suggestibility increases with the ease with which foci of sentry excitation are formed in his cortex and the depth to which all other regions of the cortex are inhibited.

According to the data of authoritative hypnologists, 80-90% of all subjects are susceptible to hypnosis, but no more than 20-35% of them can be thrown into a trance deep enough that an isolated rapport is established and all memories of the hypnotist's suggestions during the trance are erased. It is interesting that children 7-14 years old are most susceptible to hypnosis and that the elderly are least susceptible. In general, persons who do not tend to analyze their experiences are the most suggestible. Subjects who know nothing whatever about hypnotism and who cannot guess the possible results of the hypnotic technique applied to them can also be hypnotized.

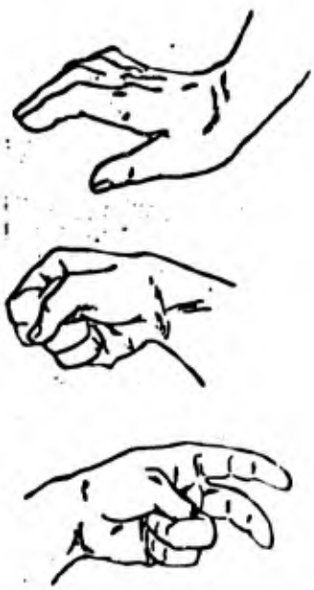
Hypnosis is an intermediate link between natural sleep and various forms of pathological sleep; it is manifested differently in different

subjects. Some are distinguished by extreme lassitude and complete muscular relaxation. If the arm of such a hypnotized subject is raised it immediately falls back heavily and lifelessly. The subject responds to the hypnotist's questions slowly and reluctantly. This is often conjoined with hyperesthesia, or increased sensitivity of the sense organs. For example, such subjects may hear commands given by the hypnotist in a low whisper at the far end of the room, but their suggestibility is low and it is difficult to awaken them. This is the "lethargic" type of hypnosis, a relatively mild artificially induced lethargy.

Charcot observed a remarkable phenomenon in lethargic subjects, which he called neuromuscular overexcitation and whose nervous mechanism is still not completely clear. If a finger is pressed against an area of the subject's skin that overlies a nerve, the muscle corresponding to this nerve goes into a state of persistent contraction. Thus, for example, pressure on the radial nerve causes extension of all the fingers, mechanical stimulation of the median nerve makes the fingers curl into a fist, and pressure on the ulnar nerve causes the hand to assume the so-called benediction position, with the second and third fingers extended and the others flexed against the palm.

The subject usually has no idea which nerves control the muscles of the hand and the hypnotist does not tell him. There is consequently neither suggestion nor autosuggestion in these experiments. This phenomenon has an inexplicable reflex character and shows the greatly elevated excitability of those nerves and nerve centers which cause muscle contraction. Pressure on these nerves when the subject is awake has no effect.* The importance of the "Charcot effect" lies in the fact that it shows that not all the phenomena observed during hypnosis are the result of suggestion or autosuggestion alone. During hypnosis the body undergoes functional changes of purely physiological origin, not

directly associated with suggestion or autosuggestion. In affirming this the physiological school founded by Charcot, Bekhterev, and Pavlov disagrees with the views of the psychological school founded by Bernheim and his followers, who reduce all hypnotic phenomena to suggestion or autosuggestion. Another proof that a hypnotic trance can be induced by means other than verbal suggestion is the hypnosis of animals, which is similar in many respects to that of humans.



Position of the fingers on stimulation of the radial (superior), median, and ulnar nerves. Experiments conducted by Charcot.

Flexibilitas cerea of the limbs (plastic muscle tonus) in a hypnotized subject (from a photograph).



A second group of hypnotic subjects is characterized principally by "flexibilitas cerea" of the limbs. The hypnotist takes the subject's hand, raises it, and, without saying a word, releases it. The arm remains in the position to which it was moved. The hypnotist can change the position of the arm, but it always remains "frozen" in the air. The subject can be placed in any comfortable pose and will maintain it for a considerable time, until he begins to show signs of fatigue. This is

the "cataleptic" type of hypnosis. Instead of flexibilitas cerea some cataleptic subjects exhibit a tendency toward persistent contracture. For example, great force is required to straighten the arm of such a subject when it is flexed at the elbow and it then returns to its prior position. In severe cases the subject's entire musculature may be in a state of constant tension. Here it is possible to demonstrate a spectacular phenomenon called the cataleptic bridge. The subject lies in a horizontal position between two chairs in such fashion that the back of his head rests on one of them and his heels on the other. As a result of the rigidity of his neck, back, and leg muscles the subject remains "suspended" in the air between these two support points. An appropriate suggestion can still further intensify the cataleptic tension of the musculature or, conversely, cause it to relax (see the figure on page ). Similar phenomena of varying severity occur spontaneously in patients with hysteria or hysteric epilepsy. There have been reports that Indian fakirs, like Christian ascetics of olden times, could remain in an attitude of prayer or some intentionally difficult position without showing visible signs of fatigue. It is possible that in such cases the individuals in question volitionally or nonvolitionally fell into a state of cataleptic autohypnosis.

A cataleptic muscular state is often observed in hypnotized animals. Their bodies can also be placed in various unusual postures, in which they are "frozen"; cutaneous and pain sensitivity disappear in this case.

Cataleptic subjects are characterized by considerably greater suggestibility than lethargic subjects. The influence of suggestion extends to both motor activity and the sense organs. For example, it is possible to suggest insensitivity to acrid odors, pungent tastes, or painful stimuli.

The greatest suggestibility is observed in subjects of the somnambulistic type. Somnambulistic subjects exhibit greater mobility and psychic activity than lethargic or cataleptic subjects. Their behavior pattern resembles that of "sleepwalkers," whom we discussed abcve. They walk freely about the room, readily enter into conversation with the hypnotist, dance at his request, accept a drink, write, and recount their experiences. Their eyes often remain open. An inexperienced onlooker may insist that such a subject is not asleep at all, although he is actually in a state of deep hypnosis. Suggested illusions and hallucinations are especially characteristic of hypnotic subjects of the somnambulistic type. Under the influence of appropriate suggestions, somnambulists may take the odor of ammonia to be the aroma of roses, a crust of bread to be an orange, the noise produced by those present to be music, the face of a close relative to be unfamiliar, something strange to be something familiar, etc. These are all examples of illusions. In such cases the suggested idea is more powerful than the perception of reality and alters it in the sleeper's consciousness (see the figure on page ).

The next stage in the development of an illusion is hallucination: under the influence of suggestion the somnambulist sees, hears, and perceives something that does not actually exist. For example, the hypnotist knows that the subject's mother has long been dead. Nevertheless, the hypnotist declares: "You are wrong; your mother is alive and here in this room. She is coming toward you. Greet her!" And the somnambulist "sees" his dead mother, greets her joyfully, plies her with questions, and behaves as though he had actually met a close relative after a long separation.

These experiments involving artificially induced visual hallucinations remove the veils of mystery from "ghosts" and "apparitions,"

which persons with disturbed imaginations sometimes see while awake and which maintain the belief that the dead survive beyond the grave. A major role in hallucination is played by autosuggestion induced by some impression or persistent, sorrowful thought of a dead relative, channeled by superstitious fear. The following is a typical example:

"I heard a noise in the corridor and, peering out, saw a man in dark clothing standing in the doorway. I was terribly frightened and fled into an adjoining room, where my father found me lying on the floor. I saw the figure in the corridor very clearly: he had long hair. I was 11 years old at the time. I sat down to prepare my lessons, but was in a very agitated frame of mind. My imagination was disturbed by the figure of the man who had appeared to me; I knew him and had not long before seen him in his grave. The sight of the corpse made a profound impression on me and this was the cause of my nervousness. The sound I heard probably had some completely natural source."*

In the days when there was a general belief in the existence of demons pathological hallucinations often had the character of sexual intercourse with so-called incubi and succubi. The following is one of the numerous old tales of this type: "In Nantes (in France – Author) there lived an unfortunate woman who was persecuted by an insolent devil. He appeared to her in the form of a beautiful spirit. Hiding his evil intentions, he cunningly used flattery to make the wretched soul receptive to his advances. Obtaining her consent, he took her foot in one hand and, placing his other hand on her head, "wed" her through these symbols of close relationship. The miserable woman's husband, a noble man, suspected nothing of this evil union. The dishonorable lover, who always remained invisible, maintained his liaison with the wife... and exhausted her with his incredible debauchery, etc."**

Cases of this sort are now encountered extremely infrequently, the

role of the demon being played by a hallucinatory image of a dead husband or lover. During the nineteen-twenties I engaged a young, healthy, almost illiterate girl as a houemaid; she confessed to me that her husband had been killed in the war, appeared to her at night and that she saw him, touched him, and "continued to live with him as man and wife." Such hallucinations, colored by intense sexual feelings, were not uncommon in convents and monasteries and reinforced the belief in the survival of the human personality beonnd the grave.

The French psychiatrist M. Simon distinguishes the category of "physiological hallucinations," which appear in healthy, even illustrious persons. Balzac, in describing the battle of Austerlitz, heard the cries of the wounded, cannon shots, and rifle volleys. When Flaubert wrote the scene in which Madam Bovary is poisoned, he tasted arsenic in his mouth, which caused him to vomit. Goethe was also subject to hallucinations: on one occasion, in broad daylight, he saw himself in his usual attire and mounted on horseback. Goethe could induce a given visual hallucination at will and it then underwent involuntary modifications. This amazing ability is also infrequently encountered in "mere mortals." In her youth, my mother was able to induce hallucinatory visions in herself. In summer she lay on her back on the ground, threw back her head, and stared into space with her eyes screwed up; against this background there gradually appeared distinct visions of landscapes, cities,castles and hovels, groups of people, and sometimes entire scenes – apparently fragmentary representations of things she had read or seen in books.

The first international congress in experimental psychology, held in Paris in 1889, distributed a large number of questionnaires in an attempt to obtain precise information on the significance of hallucinations in the development of various types of superstitions. More than

27 thousand answers were received, of which three thousand (approximately 12%) were affirmative, i.e., reported that a healthy individual had been subject to hallucinations on one or more occasions. The majority of these hallucinations were visual, a smaller number were auditory, and still fewer were tactile. In half of the auditory hallucinations the individual heard his name called. This type of hallucination has given rise to a popular superstition: he who hears himself called by someone, especially in spring (the "call of spring"), will soon die.

Hallucinations are similar to dreams in origin, being a sort of waking dream. The state of twilight consciousness that occurs before we fall asleep or immediately after we awake greatly facilitates the appearance of so-called hypnogogic hallucinations. If we spend a long time during the day enthusiastically collecting mushrooms or fishing, before falling asleep we often clearly imagine large numbers of the same mushrooms or the same fish gasping in the air. In this "presomnalent" state even completely healthy persons can experience vivid, sometimes frightening hallucinations.

I myself have repeatedly had hallucinations. Their last occurrence was quite recent, during the night of 19 March 1963, at about 4:30 AM. I was sleeping on my left side, with my face to the wall. I unconsciously turned onto my right side, opened my eyes, and saw at my bedside (although it was rather dark) what appeared to be a female figure clad in dark, disheveled clothing bending toward me and inspecting me. At the same instant I waved her away with an involuntary reflex movement of my left hand and she disappeared. I turned on the light, looked at the clock, and then wrote down what had occurred. I could not relate this vision to any image or incident from the past and it obviously foretokened nothing to me. It was probably a remnant of some dream that my memory had not retained.

Cases of direct conversion of dreams to hallucinations are known. Thus, A. Lebeaux recounts that he once dreamed of a fire and continued to see it for some time after he awoke. Simon writes: "When you dream that a pistol has been fired at you there is every reason to expect that this dream will quickly be followed by wakening. The subjective sensation is sometimes so strong that the wakened sleeper's ears still ring with the sound he ha dreamed – he still hears it."

All this shows that hallucinations, which arouse such fear in superstitious persons, are no more mysterious than dreams and, like them, can be induced by various artificial methods. Many fortune-telling techniques were based on such methods, which have been known since antiquity. Thus, visual hallucinations were induced when the fortune-teller gazed fixedly into a piece of crystal (crystallomancy) or a "magic fluid," water (hydromancy), for which a mirror was later substituted; listening to the murmur of sea-shells produced auditory hallucinations, etc. These techniques employed by fortune-tellers obviously induced a mild hypnotic state accompanied by an increase in suggestibility and a consequent tendency toward hallucinations. Unusually vivid and diverse hallucinatory images can be evoked by consumption of certain toxic substances, e.g., hashish, opium, mescaline, etc. The medieval "flight to the sabbath" was a series of visual hallucinations induced by rubbing the skin with a mixture of toxic substances, the "witches' ointment."

Mexican Indians still retain the habit of imbibing the sap of the local cactus that they call "peyote" (Echinocactus Williamsii). This juice seems to awaken the gifts of prophecy and clairvoyance. In 1925 the French pharmacologist A. Rouhier introduced this cactus into Europe and investigated its effects on himself and other Europeans. Unusually strong, prolonged excitation of the visual cortex was ob-

served: with the eyes closed, extremely vivid and beautiful images developed spontaneously in the field of vision and succeeded one another kaleidoscopically, producing a state of estatic delight. This phenomenon results from the fact that extracts of this cactus contain mescaline, as well as other alkaloids, whose action induces similar psychophysiological disturbances.

We had the opportunity to conduct several experiments with peyote extract on two healthy subjects, students 20 and 24 years of age. After receiving the extract they experienced a sharp intensification of auditory and visual sensations and images: surrounding objects appeared to become more brightly colored and sounds became louder. The students closed their eyes and their perceptions of objects persisted for a long period in the form of visual images that seemed no less real than the objects themselves. At the same time we observed the rare phenomenon of synesthesia: chords of different tonalities played on a piano seemed deafening and, when the subjects' eyes were closed, evoked sensations of flashes of light of various colors.

Motor and emotional excitation increased as the intoxication developed. Control of consciousness was retained at all times, but it was not strong enough to halt the flow of words and movement. The will was paralyzed and could not suppress unexpected outbursts of emotion. According to the subject, they were very cheerful, everything seemed extremely beautiful, and "anything was permissible." Time appeared to pass with incredible rapidity, so that the actions and speech of those about them seemed irritatingly slow. The mind worked feverishly and took unexpected jumps and turns. The subjects' handwriting underwent a severe change, becoming larger and bolder.

Special note must be taken of the sharp increase in suggestibility, to the level characteristic of the hypnotic state. Experiments involv-

ing "mind reading" (see Chapter 5) conducted during peyote intoxication yielded far more rapid and clearer results than similar experiments performed on normal subjects. This indicates an increase in the capacity for motor automatism.*

We will now turn to current experiments on hypnosis. Various changes in character traits and behavior, similar to those that arise spontaneously in certain hysterics, can be induced in hypnotized subjects by suggestion. It can be suggested during hypnosis to a subject with a tendency toward somnambulism that he is not the humble Ivan Ivanovich at all but some historic figure, and his entire behavior pattern then begins to mimic that of the personality in question, often with startling skill and realism. Somnambulists have been encountered whose character traits change markedly under hypnosis independently of suggestion by the hypnotist. A calm, taciturn individual becomes irritable, restless, and talkative. He remembers nothing of his everyday life but easily recalls everything that has happened to him in past hypnosis sessions and everything he has seen in his nocturnal dreams. This disturbing symptom, which indicates a pathological form of hypnosis in the subject, a tendency toward a "split personality," is a state that can gradually develop to a striking level, as we saw in the examples of the hysteric Felida and the young man described by the French psychologist A. Binet.

A. Binet could evoke the traits of one personality or the other in his young male patient artificially, by hypnotic suggestion. If it were suggested to the patient that he was working in the vineyard, on awakening he acted like a vineyard worker and knew absolutely nothing about tailoring, while his legs functioned normally. At the next hypnosis session it was suggested to him that he was a boy of nine or ten years; on awakening he acted like a child and was convinced that he

was working in the tailor shop and that his legs were paralyzed. He actually could not walk in this state, but had great skill with the needle. Hypnosis thus evokes a change that, in the waking state, had occurred under the influence of catastrophic shocks to the nervous system; in the hypnotic state the traits characteristic of one personality were quickly displaced by those of the other. In discussing this topic N.Ye. Vvedenskiy wrote: "It appears that different stages of the individual's life leave their impressions in layers on his brain and that these layers of impressions and residues of past experiences can (under the influence of hypnotic suggestion – Author) pass out of the active state and reenter it individually."*

The suggestibility of some hypnotic subjects of the somnambulistic type is so great that verbal suggestion affects even purely physiological processes that seemingly can in no way be related to consciousness. The following are a few noteworthy facts established by Prof. K.I. Platonov and other authoritative specialists in hypnosis.**

A suggestion of satiation ("simulated feeding") causes an increase in the number of leucocytes in the blood, so-called digestive leucocytosis, which is usually observed after food has actually been consumed. Conversely, suggested hunger, like true hunger, leads to leucopenia, i.e., a decrease in the leucocyte content of the blood. Intensified sugar intake causes a slight increase in the glucose content of the blood even in healthy persons; a similar phenomenon occurs after suggested (simulated) consumption of sugar. If it is suggested to the subject that he is experiencing severe thirst and is drinking glass after glass of water, intensified secretion of urine with a reduced specific gravity soon sets in, i.e., the same phenomenon occurs as after actual introduction of a large amount of water into the body. A suggested sensation of coldness causes blanching of the skin,

shivering, and "goose pimples," while respiratory gaseous interchange, i.e., the amount of oxygen absorbed and of carbon dioxide eliminated, increases substantially (by 30% or more), just as in actual chilling. Moreover, some authors have shown that a rise in body temperature, or "simulated fever," can be induced by a suggestion of chills or fever.

Graphic not reproducible

Mark of burst blister induced by suggestion of a burn to a subject in a hypnotic trance (from a photograph by Prof. Pod"yapolskiy).

Finally, of an especially instructive nature are the no longer dubious experiments involving "simulated burns" or "simulated blows," although such experiments are successful only with rare somnambulists displaying an exceptionally high degree of suggestibility. If a wooden rod is touched to a definite area of the skin and it is suggested to the subject that he is being burned with a red-hot iron, after an interval an actual burn appears at the site of the mock burn, i.e., the skin turns red, a blister forms, etc. Touching the skin with a pencil and suggesting to the subject that this is a sharp blow causes the skin to turn blue in the affected area (ecchymosis).

All these seemingly incredible experiments are made possible by the fact that every internal organ, every blood vessel, and every area of the skin is linked by neural pathways through the spinal cord and subcortex to the "organ of the psyche," the cerebral cortex. As a result, definite physiological processes occurring in the cortex, which serves as the basis for given psychic states, can under certain conditions intervene in the functioning of various organs, modifying their activity in different ways. Such intervention apparently follows the principle of formation of conditioned reflexes. This is indicated by

an interesting observation made by the well-known hypnologist P.P. Pod"yapol'skiy: a suggested burn can be induced only in those subjects who have actually suffered a burn inflicted with some hot object at some time during their lives.

Doctor Pod"yapol'skiy confirmed this important observation by the following experiment. "On one occasion," he wrote, "I unsuccessfully suggested to a peasant the reddening of the skin produced by a mustard plaster; not only did no reddening occur, but there were no appropriate burning or prickling sensations. I surmised that this simple peasant had probably never been treated with a mustard plaster and that his brain consequently lacked the appropriate images and faculties to reproduce all its sequelae... This proved to be the case: the subject had never been given a mustard plaster. It later happened that he had to apply such a plaster to his chest and, when I subsequently hypnotized him, suggestion quickly induced both a burning sensation and reddening at the site of the simulated plaster."*

In addition to conditioned reflexes, the principle of the dominant (from the Latin verb dominare, meaning to dominate) suggested by A.A. Ukhtomskiy in 1923 is also of great importance in hypnotic phenomena and suggestion. A dominant is a focus of increased excitability and stable excitation temporarily dominant in the central nervous system; it arises in a given region of the brain or spinal cord under definite conditions. The dominants of such a focus lies, first, in the fact that it "attracts" excitatory impulses from other nerve centers functioning in parallel with it, summing these impulses and thus becoming stronger and stronger. Secondly, its dominants results from the fact that it inhibits other nerve centers not encompassed by it, as well as the corresponding reflexes. Thanks to these two properties, a dominant transforms and controls all neural activity so long as it is in

existence. Thus, for example, the alimentary dominant created by persistent impulses from the empty stomach and intestine direct the entire behavior pattern of the hungry organism, be it an animal or a human being, toward location and capture of food. The sexual dominant acts in its own way, as does the defensive dominant, which is associated with feelings of fear. Lower-order dominants constitute the nervous basis of instincts, which, like the dominants on which they are based, are temporary in nature, succeeding one another. Higher-order dominants, which are formed in the cortex, are the physiological basis for certain psychic faculties, including such important ones as attention, the ability to concentrate, and memory. "The act of paying attention must conceal a stable focus of excitation accompanied by inhibition of other centers,"* wrote Ukhtomskiy, pointing out that the noted psychoneurologist V.M. Bekhterev agrees with this hypothesis.

According to Bekhterev, the principle characteristic of hypnosis is suppression of the spontaneous activity of the subject: he loses the ability to concentrate his attention on some facet of the reality surrounding him and consequently exhibits no active or personal relationship to external stimuli acting on his sense organs. It is understandable that, in this helpless state, he falls under the hypnotist's control. This occurs because the subject, having lost his independence and activity, can now direct his attention at a given object only in response to a verbal suggestion given by the hypnotist. Translating this psychological concept into the terms of the theory of the dominant, V.M. Bekhterev gives the following physiological interpretation of the basic hypnotic phenomena:

"Active concentration, being a so-called dominant in the physiological sense, i.e., a manifestation of intensified excitation of the prefrontal centers, thus suppresses the activity of all other cortical

regions receiving impulses from the external world. When active concentration is suppressed as a dominant, any guidance of concentration by a verbal stimulus (suggestion) to a given cerebral perceptual apparatus (visual, auditory, tactile-muscular, etc.) creates suitable conditions for a dominant in the corresponding cortical center, thus increasing the activity of the latter to the point of vivid hallucinatory images in some cases or execution of suggested actions in others."

"On the other hand, inhibition of concentration with respect to an external stimulus causes those phenomena known as negative hallucinations, in which the subject does not see (even with his eyes open – Author), hear, or feel surrounding objects. If we keep in mind the fact that the hypnotist controls active concentration when it is suppressed, it is not difficult to explain the rapport between subject and hypnotist, since the former's concentration is guided solely by the words of the latter, which are special stimuli, and cannot be transferred to the control of another individual without a special suggestion from the hypnotist."

"Finally, what appears to be posthypnotic amnesia (loss of memory regarding all that has transpired during hypnosis) is an inevitable consequence of the fact that, as in the waking state, we can reproduce (remember – Author) only those events from the past on which we fixed our active concentration at the time and this process is suppressed during hypnosis. Other events cannot be reproduced so long as they are not linked combinitively (by a conditioned reflex – Author) to active concentration."*

Bekhterev's view of the physiological nature of hypnosis does not contradict I.P. Pavlov's theory of hypnosis as partial sleep, incomplete inhibition of the cortex, which retains "sentry posts" of very clear excitation reinforced by the verbal stimuli given by the hypno-

tist. It can be said that these "sentry posts" of excitation are a dominant induced in the cortex by the hypnotist and controlled by and inseparably associated with him.

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[Footnotes]

30* From the German book by Prof. G. Halle "Magiya ili volshebnyye sily natury" [Magic, or the Supernatural Forces of Nature] (published in Russion at the print shop of Moscow Kr. Klaudiya University in 1801), pages 354-359.

30** From an article by Dr. Bird, "The Nature and Phenomenology of Trance," included in D. I. Mendeleyev's book Materialy dlya suzhdeniya o spiritizme [Materials for an Evaluation of Spiritualism], St. Petersburg, 1876, page 294.

31 See V. V. Yefimov, Son i snovideniya [Sleep and Dreams], Moscow-Leningrad, Gostekhizdat, 1947, page 8.

32* See S. N. Gal'perin, Son i snovideniya [Sleep and Dreams], Leningrad, 1945, pages 12-13.

32** See L. Levenfel'd, Gipnotizm [Hypnotism], Saratov, 1903, pages 186-189.

33* I. R. Tarkhanov, Dukh i telo [Mind and Body], Supplement to the journal "Vestnik i biblioteka samoobrazovaniya" [Herald and Library of Self-Education], St. Petersburg, 1904, page 110.

33** See the article by V. Burakovskiy entitled "Hypothermia" in Bol'shaya Meditsinskaya Entsiklopediya [Great Medical Encyclopedia] (Vol. 7, Moscow, 1958, pages 244-250).

34* A. Lemann, Illyustrirovannaya istoriya suyeveriy i volshebstva ot drevnosti do nashikh dney [Illustrated History of Superstition and Magic from Antiquity to the Present], page 489.

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| 34** | I. Mechnikov, Etyudy optimizma [Studies in Optimism], Moscow, 1913, page 183. |
| 35* | Ibid., page 186. |
| 35** | Ibid., page 187. |
| 36 | See L. Levenfel'd, Gipnotizm [Hypnotism], pages 247-248. |
| 38 | For more detail on this topic see Chapter 5. |
| 42* | From A. Lavoisier, Oeuvres de Lavoisier [Works of Lavoisier], Vol. III, 1865, pages 513-527, Russian translation in D. I. Mendeleyev's book Materialy dlya suzhdeniya o spiritizme [Materials for an Evaluation of Spiritualism], page 275. |
| 42** | D. I. Mendeleyev, Materialy dlya suzhdeniya o spiritizme, page 275. |
| 43 | S. Tsveyg, Vrachevaniye i pskihika [Medical Practice and the Psyche], Leningrad, 1932, pages 97-98. |
| 47* | I. P. Pavlov, Polnoye sobraniye sochineniy [Collected Works], Vol. VI, Moscow-Leningrad, 1952, page 98. |
| 47** | R. Heidenhain, Zhivotnyy magnetizm [Animal Magnetism], Russian translation from 4th German edition edited by Dr. Pavlov, St. Petersburg, 1881. |
| 47*** | I. P. Pavlov, Polnoye sobraniye sochineniy [Complete Works], Vol. IV, 1951, pages 425-426. |
| 48* | For more detail see P. I. Bul's book Tekhnika vrachebnogo gipnoza [Technique of Medical Hypnosis], Leningrad, Medgiz, 1955. |
| 51 | For more detail see V. Zukhar' and I. Pushkina, Gipnopediya [Hypnopedia], in the journal Nauka i zhizn' [Science and Life], 1964, No. 4, page 60. |
| 52 | I. P. Pavlov, Polnoye sobiraniye sochineniy [Complete Works], Vol. IV, page 429. |
| 54 | For more detail see P. Rishe's book Klinicheskiy ocherk bol'shoy isterii, ili isteroepilepsii [Clinical Review of Hysteria Major, or Hysterical Epilepsy], Kiev, 1886, pages 299-305. |
| 58* | A. Lemann, Illyustrirovannaya istoriya suyeveriy i volshebstva ot drevnosti do nashikh dney [Illustrated History of Superstition and Magic from Antiquity to the Present], page 507. |

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58** See M. Simon, Mir grez [The World of Dreams], St. Petersburg, 1890, page 63.

61 M. Simon. Mir grez, page 6.

63 See L.L. Vasil'yev, Ye.T. Gal'vas, Ya.I. Perikhanyants, P.V. Terent'yev. K voprosu o psikhofiziologicheskom deystvii peyotlya [The Problem of the Psychophysiological Effect of Peyote], "Trudy Instituta mozga" [Transactions of the Brain Institute], Volume XVIII, Leningrad, 1947, page 55.

64* N.Ye. Vvedenskiy. Polnoye sobraniye sochineniy [Collected Works], Volume V, page 355.

64** See K.I. Platonov. Slovo kak fiziologicheskiy i lechebnyy factor [The Word as a Physiological and Curative Factor], 3rd Edition, Moscow, 1962.

66 P.P. Pod'yapol'skiy. Voldyr' ot mnimogo ozhoga, prichinennyy slovesnym vnusheniyem [A Blister Produced by an Imaginary Burn, Through Verbal Suggestion], Saratov, 1905, page 12.

67 For additional details on this point see L.L. Vasil'yev. Printsip dominanty v psikhologii [The Principle of the Dominant in Psychology] "Vestnik Leningradskogo Universiteta" [Leningrad University Herald] 1950, No. 9, page 32.

68 V.M. Bekhterev. Prioroda gipnoza [The Nature of Hypnotism] "Vestnik znaniya" [The Herald of Knowledge], 1926, No. 1, pages 38-39.

## 4. SUGGESTION AND AUTOSUGGESTION IN THE WAKING STATE

The nervous mechanism of suggestion and autosuggestion has now been fully revealed by science. In olden times these phenomena were assumed to be miracles. It has long been known that persons who entered a state of religious ecstasy and vividly imagined the suffering of Christ on the cross have developed bleeding sores, so-called "stigmae," on their hands and feet at points corresponding to the wounds of the crucified Christ. In his lectures N.Ye. Vvedenskiy discussed one such case that occurred comparatively recently (in the 19th century) and involved a peasant girl by the name of Lateaux: "the Belgian Academy of Sciences appointed a special commission to investigate this case. One of the girl's hands was carefully bandaged and seals were even applied to the bandages; on Good Friday, at the time of the Crucifixion, the seals were broken, the bandages were removed, and it was found that localized bruises had actually appeared on her hand." Vvedenskiy concludes his discussion with the statement: "It is thus possible in the waking state (and not just under hypnosis), through some sort of autosuggestion, to exert local influences on the vasomotor system and on local vegetative (trophic – Author) processes."*

Similar phenomena in less pronounced form can now and then be observed in everyday life. As an example we can cite the following case, which occurred in my presence and which I then recorded. An acquaintance of mine, a young man, left a well-heated rural bath-house and noticed a repulsive species of insect he had never encountered before, an earwig. With a feeling of disgust he picked the insect up

in the fingers of his right hand in order to examine it more closely. The earwig twisted itself and attempted to pinch the fingers holding it with its "pincers"; it was unsuccessful in this, however, since the young man, exclaiming in surprise, shook the insect to the ground with an abrupt motion of his hand. Nevertheless, on the skin of the fingers with which he had picked up the insect there soon appeared clearly visible crimson spots, one on the middle finger and two on the index finger. No burning sensation or pain was felt in the discolored areas; the spots could not be washed off. They were undoubtedly a manifestation of local dilitation of the cutaneous blood vessels caused by the autosuggested idea of a supposed bite and the resultant shock. It is possible that the preliminary visit to the bath-house, involving severe alternate exposure of the skin to hot and cold water, increased the reactivity of the vasomotor reflex apparatus and thus facilitated development of the phenomenon described.

An interesting case of this type is described in the memoirs of M.F. Andreyeva, the wife of Maxim Gorkiy. It occurred at their home on the Isle of Capri. At the time, the great writer was working on the second part of his story "Okurov Town," which contains a scene in which a husband kills his wife in a fit of jealousy, plunging a meat knife into her liver.

Maria Fedorovna, in an adjacent room, heard something heavy fall to the floor in her husband's study. She rushed into his room and saw an incredible sight:

"A.M. lay on his back at full length on the floor near his desk, with his arms extended... I unbuttoned his jacket, tore his silk jersey away from his chest in order to apply a compress over his heart, and saw a narrow reddish stripe running down his chest from his right nipple... It became more and more distinct and angry-looking.

'How it hurts!' he whispered.

'Just look at what has happened to your chest!'

'Ugh, the devil!... Your understand... how it hurt when the meat knife was stuck in my liver!...'

With horror I thought, 'He has fallen ill and is delirious!'"*

When Aleksey Maksimovich finally came to his senses he recounted the murder scene which he had just described in his story.

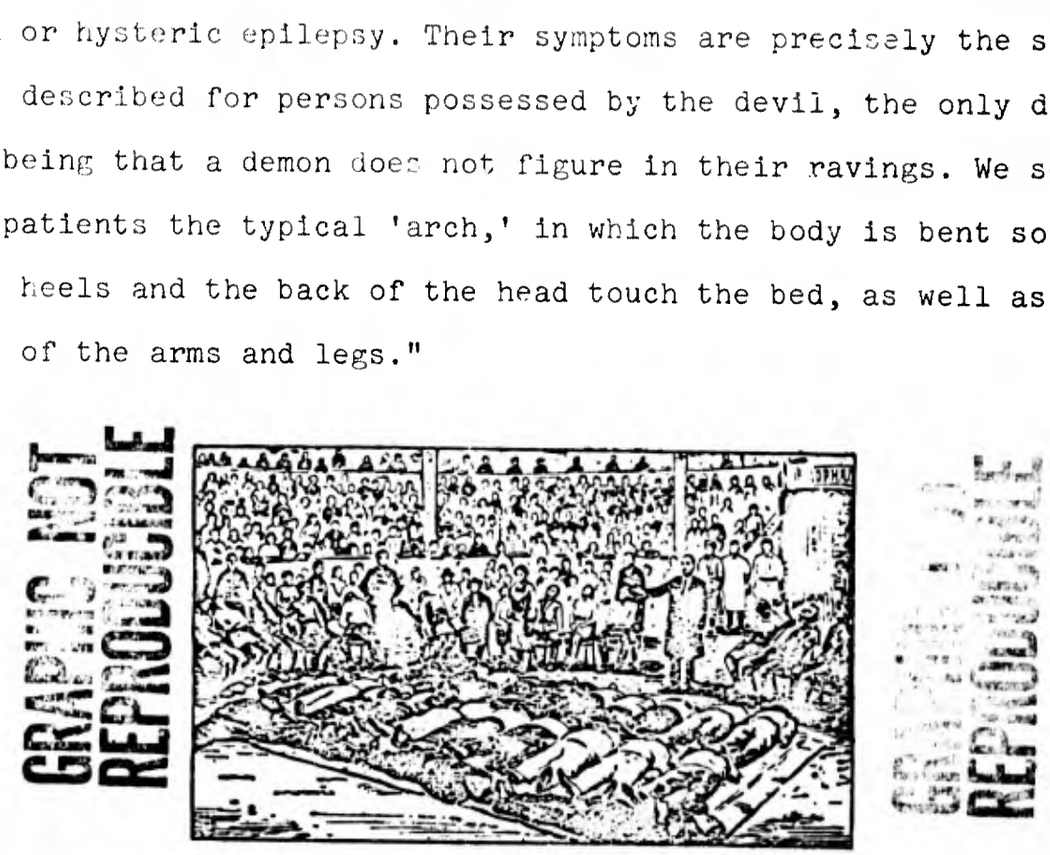
"...Only then did I understand," reminisces M.F. Andreyeva, "that he had so vividly imagined this woman's pain, her feelings, her wound, that it produced a stigma; I remember that it persisted for several days. I went to see a doctor, who explained that such cases are common in particularly nervous, impressionable individuals.

It happened to Flaubert, who experienced the poisoning of Madam Bovary. It happened to Aleksey Maksimovich more than once, but this was probably the most striking instance and I have a clear memory of it.**

When religious superstition were common everywhere, phenomena involving mutual suggestion and autosuggestion in the waking state sometimes affected large numbers of persons, taking on a contagious character and growing to the proportion of so-called psychic epidemics. In one of his books V.M. Bekhterev characterized the various types of psychic epidemics that have arisen at different times and in different nations as collective hallucinations, mass seizures of hysteric convulsions, a universal belief in possession by the devil or in witchcraft, etc.***

"In order to cure possession, the evil eye, and hysteria," wrote V.M. Bekhterev, "It was usual to resort to religious forces, i.e., prayers were read over those 'possessed' or the devil was invoked in church and objured to worship God and leave the 'possessed,' to which

the latter usually responded with blasphemous words and gestures, which became increasingly sharp, or a new fit of convulsions. If we visit a modern psychiatric hospital, we find patients suffering from hysteria or hysteric epilepsy. Their symptoms are precisely the same as those described for persons possessed by the devil, the only difference being that a demon does not figure in their ravings. We see in such patients the typical 'arch,' in which the body is bent so that only the heels and the back of the head touch the bed, as well as contracture of the arms and legs."




A demonstration of mass hypnosis by the noted stage hypnotist Ornal'do (N.A. Smirnov) in a circus ring at Baku in 1929. A hypnotic sight increases the hypnotizability of the viewer. Something similar to a psychic epidemic is produced (from a photograph).

"In olden times such cases were cured by the force of suggestions (made in the waking state – Author) associated with religious fervor. They are now treated by suggestion on the part of the physician, who knows how to instill belief in an eventual cure. "One-armed," "debilitated," and "cataleptic" individuals were cured in precisely this manner at the beginning of the modern era. There is every reason to maintain that, in olden times, the terms "one-armed" and "debilitated" were applied to all paralytics, including those affected by hysterical paralysis of the arms and legs, which is known to be susceptible to thera-

peutic suggestion."*

It is difficult to believe, but similar psychic epidemics can still be observed. Individual phenomena of this type have occurred in time of war. The temporary occupation of a portion of Soviet territory by the German fascist invaders created conditions for the revival and dissemination of bourgeois ideology and religious and other superstitions. This was to no small degree facilitated by the hardship of war, the death of many persons, anxiety over the fate of close relatives and one's own fate, and uncertainty regarding the future. The following case, which occurred in Yelabuga in 1943 and which I recorded at the time, can serve as an illustration.

Two local residents, P. (20 years old) and Z. (16 years old), factory apprentices, received a series of anonymous letters written in a sprawling hand, which said that on a certain day at a certain hour they would fall ill, suffering from tremors, loss of speech, deafness, headaches, and pains in the arms... At the appointed time all this came to pass. The symptoms suggested by the letters lasted for three weeks in P. and for several days in Z. Both girls later reported that they had dreamed of an old woman who supposedly did them harm. A medical assistant from the local polyclinic was sent to see the patients and the anonymous letters were handed over to the People's Court, which examined the evidence. It should be added that a milder form of the same hysteric symptoms appeared in several girls who had visited the patients and witnessed their convulsions. This was nothing other than a rudimentary psychic epidemic, which, however, was quickly suppressed.

Cases of autosuggestion leading to one or another of the "psychogenic" diseases are quite frequently encountered. An obsessive idea regarding a disorder of some organ that is actually completely healthy

can lead to an actual functional disturbance in a hypochondriac. This occurs in both ignorant and educated persons, even physicians.

Academician I.R. Tarkhanov describes an interesting case of this type. A noted physician, while reading a lecture on cardiovascular diseases, began to turn his attention to the functioning of his own heart; severe palpitations developed and his pulse became nonrhythmic. Only by taking a trip intended to distract his mind from the morbid sensations in the vicinity of his heart did the doctor cure himself of the ailment he had acquired.*

A still more amusing case involved the physician Eisemann, who attended Princess Schwartzenberg. On his first visit to the bedside of this important patient the doctor was greatly disconcerted by a loud rumbling in his intestines caused by intensified peristalsis. On subsequent calls he was very fearful that this noise would be repeated. However, as soon as he approached the patient's bed a loud rumbling developed in his abdomen. This occurred on every visit for an entire week, although his intestines were completely quiet when he called on his other patients. In desperation, Eisemann finally decided to address the princess in the following words: "Your Excellency, for a whole week you have heard noises in my intestines that have greatly embarrassed me. The first time they were accidental, but they were then repeated because I feared such a repetition and thought about it. In order to put a stop to them, I decided to explain and apologize to you." Remarkably, after this explanation the doctor's abdominal noises never reappeared in the presence of this patient.**

It is not surprising that there can be cases of the converse type, in which actually disrupted organic functions can be restored to normality by appropriate suggestion or autosuggestion. This is the basis for psychotherapeutic methods, which, in the hands of a physician

skilled in the use of suggestion and autosuggestion, often produce striking results in the treatment of diseases caused by disturbances of neural and psychoneural activity.

Treatment by suggestion under hypnosis and in the waking state now rests on a firm base, I.P. Pavlov's theory of higher nervous activity. Psychotherapists employ suggestion with a complete understanding of the manner in which it acts and the neural mechanisms it activates. The curative power of verbal suggestion was previously utilized blindly, with no comprehension of its nature, and the patient was consequently often done more harm than good. The magical incantations of sorcerers and the spells of witches were essentially a naive form of verbal suggestion based on superstitious ideas; they sometimes achieved their purpose all the same and ignorant persons assumed them to be "miraculous cures."

The following is an example of such a suggestive spell (said over water employed for curing various diseases): "You are salt – you will make everything salty! You are ashes – you will corrode everything! You are coal – you will blacken everything! Salt away, salt; corrode, ashes! Blacken, coal! He who drinks this water will shed all his ailments! He who licks these ashes will lose all his ills! He who tastes this salt will be freed of disease! He who bites into this coal will be blind to his troubles! The sufferer, so-and-so, drinks the water. My words have been fulfilled, strong, strong, swift and strong!"*

Writing on this subject, V.M. Bekhterev stated: "The secret of therapeutic suggestion was known to many simple people, among whom it was transmitted by word of mouth over the centuries in the form of sorcery, witchcraft, spells, etc... In addition to suggestion, autosuggestion is often effective; in this process the individual convinces himself of the miraculous power of some remedy. Thus, for example, auto-

suggestion explains the effect of many so-called "sympathetic" remedies, which often have a curative action. Ferraus cured a fever with the aid of a slip of paper on which was written the two words "Against fever," from which the patient was to tear off one letter each day. There have been cases in which "bread pills," "Neva water," "Laying on of hands," etc., have had a therapeutic effect. This is explained by the fact that one word, spoken in a sufficiently suggestive tone, can induce paralysis, convulsions, delirium, or lameness in unusually suggestible individuals, cases in which the history of antiquity and the middle ages is so rich as a result of the spreading belief in the power of the devil. It is consequently easy to induce a cure in a suggestible person through essentially indifferent remedies."*

Loss of pain sensitivity in a convulsive (from an old print).

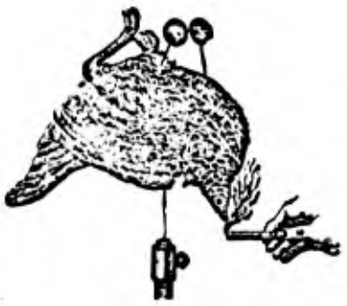
We can cite the following curious example. Various popular "sympathetic" remedies have long been employed for removing warts. They are all calculated to have as strong an effect as possible on the patient's imagination and thus suggest to him a belief in their curative power. Physicians have modernized this old therapeutic technique and now utilize it successfully. In an article entitled "Treatment of

Warts by Hypnosis," Bruno Bloch presents the following result. Of 179 patients, 55 (30.7%) were cured in one hypnosis session, 32 (17.9%) in two sessions, 8 (14.4%) in three sessions, and 3 (1.7%) in more than three sessions. A total of 98 patients (54.7%) were cured, 2 (1.1%) were partially cured, and 79 (44.2%) received no benefit from the treatment. More than half the patients were thus cured of their warts.* The success of this treatment depended primarily on the suggestibility of the patient, as well as on the type of wart ("flat," "vulgar," etc.). Hypnotic trance increased the patients' suggestibility, but a therapeutic effect was obtained in the most suggestible individuals in the waking state.

Cures have sometimes taken place in persons with a fervent belief in the miraculous effect of icons and relics, but they were induced by highly effective autosuggestion. It is obvious that this could occur only in those cases where the disease was of psychogenic origin, i.e., was caused by some emotional shock and consisted in a reversible functional disturbance (without structural damage) of nervous activity. Such diseases include paralysis, loss of cutaneous sensitivity, blindness, and dumbness in hysterics, i.e., ailments that are now readily accessible to therapeutic suggestion on the part of psychotherapists. The following are a few examples from V.M. Bekhterev's practice.

On one occasion Bekhterev brought a patient who had been in the clinic for a month and a half to the auditorium on a stretcher to present to his medical students. For more than ten months this patient had been unable to move her legs as a result of a paralysis that developed immediately after a hysteric fit. In the auditorium Bekhterev put her into a trance and then, by suggestion, brought her to her feet and led her around the room, telling her that she was no longer para-

lyzed and would be able to walk after she awoke. On being roused from her trance the patient, to the astonishment of those present and her own delight, walked by herself into the ward, astonishing everyone in that section of the clinic. It was then suggested to the patient, while she was awake, that she cease her hysteric fits, after which she was finally freed of them.



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Loss of pain sensitivity and catalepsy in a hypnotized chicken (after Bekhterev).

Another example involved a peasant who had suffered from a prolonged cramp in his arm (contracture) that was not susceptible to treatment by the usual method. Bekhterev straightened his arm under hypnosis. On awakening, the "one-armed" peasant, with unrestrainable cries of joy, demonstrated to all present at the session that he could raise his arm, exclaiming: "Its well, look, look, completely well!" However, V.M. Bekhterev regards the most remarkable case in his practice to be the treatment of hereditary blindness by hypnotic suggestion. This case astounded even physicians experienced in diseases of the eye, since they regarded blindness of this type as incurable by any medical means.*

There have been numerous apparently reliable reports of fakirs, religious fanatics, and medieval witches and magicians indicating that, when in a state of ecstasy, they lost their sensitivity to pain and underwent the most incredible self-mutilations, tortures, and so forth with amazing fortitude. It is quite possible that some degree of autohypnosis, the suggestive effect of a fanatic belief, or autosuggestion played a part in such cases.

From time to time there appear in European circuses individuals who demonstrate their insensitivity to pain. I became acquainted with

one such performer, who bore the sonorous Indian name To-Rama, although he was Austrian in origin. He was a chemical engineer and also a specialist in hypnotizing various wild animals, a man devoted to his pursuit and completely trustworthy. I heard from him an account (which later appeared in the press*) of the circumstances and manner in which he trained himself to inhibit his sensitivity to pain. Puncturing the skin of his palm, forearm, shoulder, etc., with a long, thick needle actually caused no objective signs of pain: recording of his pulse and blood pressure revealed no changes when the punctures were made; no reflex contraction of his pupils, a reliable symptom of concealed pain, was observed.

At the end of the First World War, To-Rama was severely wounded by a shell fragment. At the field hospital his condition was assumed to be hopeless: so the doctors said and he overheard them. He was placed in a ward with the dying. "Then," To-Rama wrote in his article, "something in me rebelled... I gritted my teeth and had only one thought: 'You must stay alive, you will not die, you will feel no pain,' and so forth. I repeated this an infinite number of times, until it had gone so deep into my flesh and blood that I finally ceased to feel pain. I do not know how it happened, but the incredible came to pass. The doctors shook their heads. My condition improved from day to day. Thus I remained alive only with the aid of pain. After two months in a Vienna hospital I underwent a minor operation without a general or even local anesthetic, a single autosuggestion being sufficient. When I had fully recovered I worked on my system of self-control and went so far in this direction that I do not feel pain if I do not wish to do so."

This case is far from unique. The Soviet author Viktor Fink wrote about his French friend Jean Richard Bloch. This was during the Second

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Tibetan lama with prayer wheel (pencil drawing by the well-known Swedish artist Sven Hedin).

World War, after Bloch and his wife had been evacuated from Moscow to Kazan'.

"During the evacuation Bloch fell seriously ill. He had a very severe form of inclination of the lungs. When Marguerite Bloch asked a doctor whether Jean Richard would live, he turned away with a frown. Jean was in very, very poor condition. The doctors were astonished when he began to recover. As he told me (Fink – Author) afterward, he felt that it was because of this that he survived.

'I was continually exerting my will!' he said. 'I constantly repeated: "No, I do not wish to die before the victory! No, I will never agree to die so far from France! No, I must certainly recover so that I can return to France! No, I will not die so far from France before the victory!" and thus I overcame death.'"*

What To-Rama and Bloch succeeded in achieving in themselves by autosuggestion, psychotherapists achieve in their patients by suggestion under hypnosis or even in the waking state. In cases where anesthesia is contraindicated by the individual's health, surgery can be

performed on sufficiently suggestible patients under hypnosis or even in the posthypnotic waking state after a hypnotic suggestion intended to eliminate or prevent pain has been made. The same techniques are also employed in painless childbirth.

All this shows that verbal suggestion or autosuggestion can successfully be employed to selectively inhibit the cerebral reflex centers that deal with painful sensations. On the other hand, these same procedures of suggestion and autosuggestion can be used to create and maintain a given focus of protracted, stable excitation and increased excitability in the central nervous system, i.e., what A.A. Ukhtomskiy called a dominant.

In the account mentioned above To-Rama calls special attention to the fact that he achieved his goal by repeating the same thought, the same phrase "an infinite number of times." It is precisely this unceasing repetition of the same thing that is the principle condition for formation of a dominant and the secret of the beneficial effect of autosuggestion – a secret that had been known since antiquity to Oriental peoples and Christian aesthetics and that is now employed in rationalized form by psychotherapists.

The Buddhists of India and Tibet induce a state of ecstasy by incessantly repeating a prayer to Buddha: "Om, mani pad-me hum!" ("Hail, jewel in the lotus flower!"; "jewel" is one of the names of Buddha). In order to spare themselves the infinite repetition of these words, Buddhists use a so-called "prayer wheel," i.e., a drum rotating on a shaft and bearing this inscription. With the drum spinning before him, the Buddhist rhythmically reads the prayer a countless number of times.

A similar role for the Christian aesthetics was played by an equally brief "prayer to Jesus." "Think of a rosary," says one old precept, "and use it to say at least three thousand prayers each day at first

(then gradually increase the daily repetitions of the prayer to twelve thousand). Sit in silence and solitude, bow your head, close your eyes, hold your breath, examine your heart in your mind's eye, and move your mind (i.e., your thoughts) from your head to your heart. While breathing say "Lord Jesus Christ, forgive me" (the "prayer to Jesus" - Author) in a low voice or with your mind alone. Try to avoid thought, have quiet patience, and repeat your lessons often."

In a rare old book entitled "Otkrovennyy rasskaz strannika dukhovnomu svoyemu ottsu" [The Frank Account of a Wanderer to His Spiritual Father] (printed in Kazan' in 1881) one can read a wanderer's remarkable narrative of how he learned "to pray unceasingly" and of the state of blissful ecstasy into which this plunged him. It is difficult to refrain from presenting more than one excerpt from this book:

"On the road I ceaselessly say the prayer to Jesus, which is more precious and sweet to me than anything else. I sometimes walk seventy versts or more a day, but I do not sense that I am walking but only that I am saying the prayer. When severe cold chills me I begin to repeat the prayer more vigorously and soon I am warm. If hunger begins to overcome me I invoke the name of Jesus Christ more frequently and forget what it was that I wanted. When pain appears or rheumatism develops in my back and legs I concentrate on the prayer and do not heed the pain. When someone insults me I just remember the delight of the prayer to Jesus: the insults and anger pass and I forget everything. I become a half-wit, nothing troubles me, nothing interest me, I am heedless of all the bustle about me, and everything is the same in my solitude; by habit alone I wish to ceaselessly repeat the prayer and when I am occupied in this manner I am very happy. God knows that this is how it is with me."

Let us now consider the prosaic form in which essentially the same

phenomenon is brought about by repeated autosuggestion in modern psychotherapy. According to Bekhterev, a definite autosuggestive formula must be worked out beforehand for each individual case; it should be appropriate to the patient, be couched in an affirmative form, and be in the present rather than in the future tense. Let us assume that an individual addicted to wine wishes to be cured of his ailment by autosuggestion. He must repeat the following autosuggestive formula: "I have taken a pledge to neither drink nor think of wine; now I am completely freed of harmful temptation and do not think about it at all." This verbal formula must be repeated in a low tone many times, preferably before going to sleep and immediately after awakening in the morning, and the patient must fix his full concentration on it. Such autosuggestion can be effective in many cases, provided that the patient is able to concentrate on it.*

The greatest recent success in the therapeutic use of autosuggestion fell to the credit of one Emile Coue, who was not even a physician, but only a pharmacist in the French city of Nancy, an old center of scientific hypnology. Coue's method came into wide use and attracted fervent adherents in all parts of the world. Just as Bekhterev's method, described above, it consisted in the repeated whispering of verbal autosuggestive formulas appropriate to the specific case and couched in positive, categorical terms. The only difference lay in the fact that, according to Coue, the whispering was to be done not "with the patient concentrating his full attention on it" (as in Bekhterev's method), but automatically and rapidly, in a state of complete passiveness and with the mind "blank" (so far as possible thinking of nothing while the autosuggestion is being made).**

No matter how strange Coue's method appeared at first glance, it has undoubtedly had a therapeutic effect in many cases. Like verbal

suggestion under hypnosis (see the end of the preceding chapter), it is based on a nervous mechanism, the formation in the central nervous system (the cerebral cortex in this case) of a long-acting dominant capable of causing corresponding rearrangements in the body and the psyche. Formation of such dominants also explains the ecstatic states observed in Buddhists and Christian aesthetics and described in this chapter. I know that A.A. Ukhtomskiy held the same view on this subject.

There have been several cases in my practice that enable me to be convinced that Coue's autosuggestion method, carried out by the patient at home during and after hypnotherapy, promotes prolongation and fixation of the therapeutic effect of the latter. This is the principle purpose of autosuggestion methods. For example, hypnotic suggestion makes it possible to alleviate the intolerable pain caused by chronic inflammation of the trigeminal nerve, but the relief obtained is usually only temporary. The course of therapy by hypnotic suggestion is completed and the pain returns, sooner in some patients and later in others. If it is suggested to the patient during his hypnosis sessions that he can combat the pain by repeating a verbal autosuggestive formula and if he actually does so when necessary, the effect of the hypnotherapy can be substantially prolonged and even fixed for the remainder of his life. Similar results have been obtained in treating alcoholics.

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[Footnotes]

72 N.Ye. Vvedenskiy, Polnoye sobraniye sochineniy [Complete Works], Vol. 5, page 349.

74 M.F. Andreyeva, Perepiska, vospominaniya, stat'i [Correspondence, Reminiscences, Articles], Moscow, 1961, page 164.

74 Ibid., page 327.

74 See V.M. Bekhterev, Vnusheniye i yego rol' v obshchestvennoy zhizni [Suggestion and Its Role in Social Life], St. Petersburg, 1908.

76 V.M. Bekhterev, Vnusheniye i chudesnyye istsepleniya [Suggestion and Miraculous Cures], Vestnik znaniya [Herald of Knowledge], 1925, No. 5, page 324.

77 See I.R. Tarkhanov, Dukh i telo [Mind and Body], Supplement to the Journal Vestnik i biblioteka samoobrazovaniya [Herald and Library of Self-Education], page 160.

77 Ibid., page 155.

78 See F.F. Fisher, Lecheniye magicheskimi, okkul'ticheskimi i simpaticheskimi sredstvami [Therapy with Magical, Occult, and Sympathetic Remedies], St. Petersburg, 1908, page 47.

79 V.M. Bekhterev, Vnusheniye i chudesnyye istseleniya [Suggestion and Miraculous Cures], Vestnik znaniya [Herald of Knowledge], 1925, No. 5, page 327.

80 See A.I. Kartamyshev, Gipnoz i vnusheniye v terapii kozhnykh bolezney [Hypnosis and Suggestion in the Therapy of Skin Diseases], Moscow, 1953.

81 See V.M. Bekhterev, Vnusheniye i chudesnyye istseleniya [Suggestion and Miraculous Cures], Vestnik znaniya [Herald of Knowledge], 1925, No. 5, page 329.

82 See Chto pishut o To-Rama (Otzyvy russkoy i inostrannoy pechati) [What has Been Written About To-Rama (Reviews from the Russian and Foreign Press)]. Izd. Leningradskogo gostsirka, [Publishing House of the Leningrad State Circus], 1926.

83 Viktor Fink, Literaturnyye vospominaniya [Literary Reminiscences], Moscow, 1963, pages 264-265.

86 See V.M. Bekhterev, Gipnoz, vnusheniye i pshikhoterapiya [Hypnosis, Suggestion, and Psychotherapy], St. Petersburg, 1911, page 53.

86 See Emile Coue, Ce que j'ai fait [What I Have Done], Nancy, 1924; Emile Coue, La Maitrise de soi-memepar l'autosuggestion consciente [Self-Mastery by Conscious Autosuggestion], Paris, 1926.

## 5. AUTOMATIC MOVEMENT

In 1848 an event occurred in an American family named Fox that has been judged to be the starting point of the most astounding psychic epidemic of modern times, one which was responsible for a progressive crisis in capitalist society, the growth of mysticism (the belief in the mysterious), and all sorts of superstition.

The city of Rochester, in which this family lived, became the birthplace of spiritualism, a superstition that soon spread over America and then to Europe. The phenomenon that gave rise to the growth of spiritualism was the following: when members of the aforementioned family (the mother, father, and three young daughters) sat around a table and placed their hands on it, it began to move, rocking from side to side and beginning to emit cracklings and rappings; if the participants in the seance read out the alphabet, words and entire phrases could be assembled from the letters whose pronunciation coincided with these rappings. Superstitious participants in such seances interpreted them as messages from "the next world." The news spread that the souls of the dead (which came to be called spirits) had finally enabled to communicate with the living as a result of the miraculous ability of the Fox girls to serve as intermediaries (mediums) between the world of the dead and that of the living. However, it was soon found that "mediumistic faculties" were not such a rarity. Mediums turned up everywhere and "table-rapping" became the fashion, attracting first hundreds and then thousands and hundreds of thousands of people. Even scientists of world renown were found to be among

those fascinated by this new form of superstition.

Spiritualistic seance (from an old drawing).

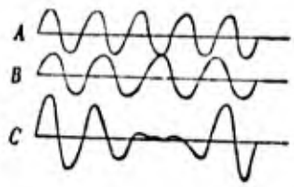
There was no lack of skeptics, however. The first to speak out against the spiritualistic madness were the noted French chemist M. Chevrel, the even more famous English physicist M. Faraday, the English surgeon J. Bred, who was mentioned above as the founder of modern hypnotism, the latter's colleague V. Charpentier, and I.R. Tarkhanov in Russia.* They called the attention of the scientific world to so-called ideomotor actions and demonstrated that these could explain all the movements of spirit tables, as well as many mysterious phenomena of the same ilk.

What is an ideomotor action? This can be shown by a few examples.

We think without accompanying our intellectual activity by any visible movement. This does not mean, however, that we make no movement at all. Those that do occur can be detected by the use of special observation techniques. For example, the subject is asked to hold a cord, to the end of which is fastened some sort of light weight, thus producing a type of pendulum. He is then asked to think concentratedly about some movement, such as rotation of the pendulum in the clockwise direction. Soon, to the subject's amazement, the weight begins to move in this direction, describing a circle. What has happened? The process of cortical excitation associated with the idea of a given motion forces us to automatically execute the corresponding movement. This is called an ideomotor action. In this case the subject unconsciously makes scarcely noticeable rotary movements, which are imparted to the weight suspended from his hand. As is to be expected, the intensity of ideomotor actions varies from individual to individual, but everyone is capable of them.*

An ideomotor action – suggested swinging and rotation of a pendulum. Chevrel's experiment.

This phenomenon had been observed by the ancient Romans and they utilized it in certain types of fortune-telling. The following is but one example of such techniques. In his outstretched hand the subject held a string to which a ring was tied and suspended it over a cup on whose rim letters were written. The ring then began to swing, in precisely the direction expected by the subject. If he were secretly thinking of someone, the ring would touch the letters forming this person's name. In this case the effective factor was not external suggestion, but autosuggestion. The same thing occurs




Kymogram of ideomotor impulses imparted to a table by two participants (A and B) in a spiritualistic seance. C) shows the result of summation of these impulses (after Lemann).

in fortune-telling with the aid of a saucer. Several subjects take a large sheet of paper and write the letters of the alphabet on it at random. The sheet is covered with an inverted saucer, on which the subjects place their fingers. To their amazement, a more or less appropriate answer is sometimes obtained to a mentally closed question: the saucer, under the impetus of the unconscious movement of the subject, successively comes to rest near those letters which, in aggregate, spell out the expected words or sentences. Superstitious persons deceive themselves in this case: they believe that they have received an answer from a guardian "spirit" when they have actually unconsciously answered their own question.

Using an ingeniously contrived physical recording system, M. Faraday demonstrated in 1853 that the hands of the participants in spiritualistic seances impart a series of unconscious ideomotor impulses to the table. Despite the negligible force of each individual impulse, in aggregate they are sufficient to set even a rather heavy table in motion. In the same manner, a child can set a heavy bell moving by a series of weak pulls on the bell-rope.

After M. Faraday, the psychologist A. Lemann was concerned with the same problem. He devised a method for recording the movements of the hands of seance participants, using a kymograph, i.e., a cylinder faced with smoked paper and rotated by a clockwork mechanism. The hand

movements of each participant were recorded in the form of a curve on the kymograph paper. Analysis of curves obtained before and after the table began to move enabled Lemann to show how noncoincident ideomotor impulses in different directions imparted to the table by several participants could, when summed, cause the table to move and rock. Such rocking also indicated letters of the alphabet read aloud by one of the participants. As in fortune-telling with saucers, coherent phrases containing the answer to the question asked the "spirit" were sometimes obtained. The role of the "spirit" was unwittingly played by the so-called medium, i.e., the participant in the seance in whom the capacity for ideomotor actions was most highly developed. However, let us have the words of Dr. Lemann himself, an expert on this topic:

"I often observed that, when the participants (in the seance – Author) were uncertain, the first movement (of the table – Table) were very indecisive, until something like the beginning of a word was obtained. Then things became livelier, since the participants had more definite ideas; the final letters of the word came very quickly. The indecisiveness returned at the beginning of each word, until a hint of a sentence clear to all was received, and then the final portion was rapped out very rapidly and decisively."* The situation is completely different when a medium participates; he is in complete control of the table and the responses rapped out reflect his own ideas, some conscious and some unconscious. As a result, says Dr. Lemann, the unusual communications mentioned in accounts of spiritualistic seances are received. However, the impression of something wonderful is due to the participants' ignorance of the psychophysiological phenomena, ideomotor acts, which cause these spiritualistic "miracles."

It is obvious that the foregoing applies only to those cases in which the participants in the seance rap out the answers to their own

questions "honestly," by means of unconscious ideomotor impulses. This is, however, rare. Far more often spiritualistic seances are converted into an arena for the most shameless, fraudulent swindles carried out by some prankster or professional medium who receives a considerable sum for a seance. During the middle eighteen-seventies, when the craze for spiritualism had become quite wide-spread, the prominent Russian chemist D.I. Mendeleyev suggested that the Physics Society of Peterburg University set up a special commission to study mediumistic phenomena. "The preoccupation with table-rapping, conversing with invisible beings, etc., " he wrote in his proposal, "threatens to encourage the spread of mysticism, which can distract many persons from a healthy outlook and intensify superstition... In order to counteract the spread of this groundless doctrine and as yet futile occupation with mediumistic phenomena, they should not be ignored but must, in my opinion, be closely scrutinized." The commission on mediums, headed by Mendeleyev himself and composed of noted scientists, worked for about a year. Famous mediums from abroad were invited. The seances were conducted under conditions that excluded the possibility of fraud. To this end a manometric table that precisely recorded every movement, no matter how slight, of the participants' hands was built to Mendeleyev's plans.* According to a popular saying, however, spirits run from science like the devil and fly from incense. Famous mediums immediately wilted and, when they attempted to put on a show, were exposed in their fraud. The commission published a report that dealt a fatal blow to spiritualism and concluded with the words: "Spiritualistic phenomena result from unconscious movements or conscious fraud and the doctrine of spiritualism (the belief in spirits) is a superstition."

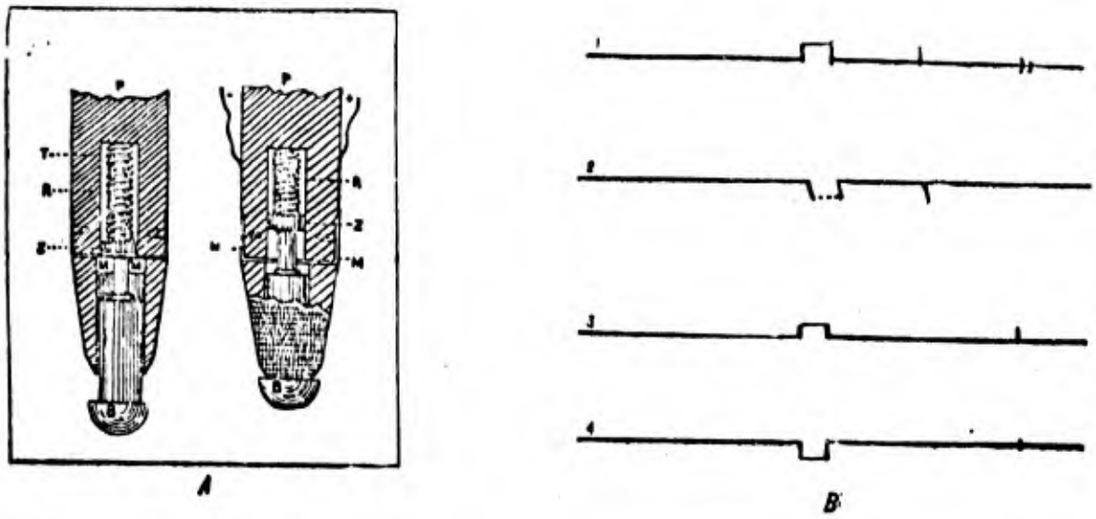
The death sentence was passed on this superstition in a well-known article by F. Engels entitled "Science in the 'spirit' world," which

was directed at eminent scientists of the time who had been caught up in the spiritualistic epidemic. Engels pointed out examples of how "the empiricist contempt for dialectics has been punished by the fact that some of the most sensible empiricists have become victims of the most preposterous of all superstitions – modern spiritualism."In concluding his article, Engels cites a witty remark made by the noted English biologist T. Huxley: "In my opinion, the only good that could come from proof of the validity of spiritualism is that it would be a new argument against suicide. It is better to live as a street-sweeper than to be dead and babble nonsense through the mouth of some medium who receives a guinea for a seance."*

In his comedy "The Fruits of Enlightment," the great literary genius Leo Tolstoy ridiculed the attraction of the educated classes to spiritualism. The spiritualistic fever continued, however. In 1912 there were in Russia as many as two thousand officially registered spiritualistic societies and the number abroad was even larger.** It is only a single step from blind faith to madness and it was not without reason that Tertullian, one of the first Christian theologians, wrote that a belief develops precisely because the thing believed in is absurbed.

Only the Soviet system, regularly acquainting the broad masses of the populace with the achievements of dialectical materialism and the exact sciences, put an end to spiritualism and many other dangerous types of superstition by demolishing their sociopolitical basis.

It is thus natural that phenomena such as the swinging of pendulums, the movement of saucers, and table-rapping merit attention, being ideomotor actions explicable by the fact that concentrated thought about or expectation of some movement causes it to be unconsciously executed, although in a very weak, scarcely perceptible form. There

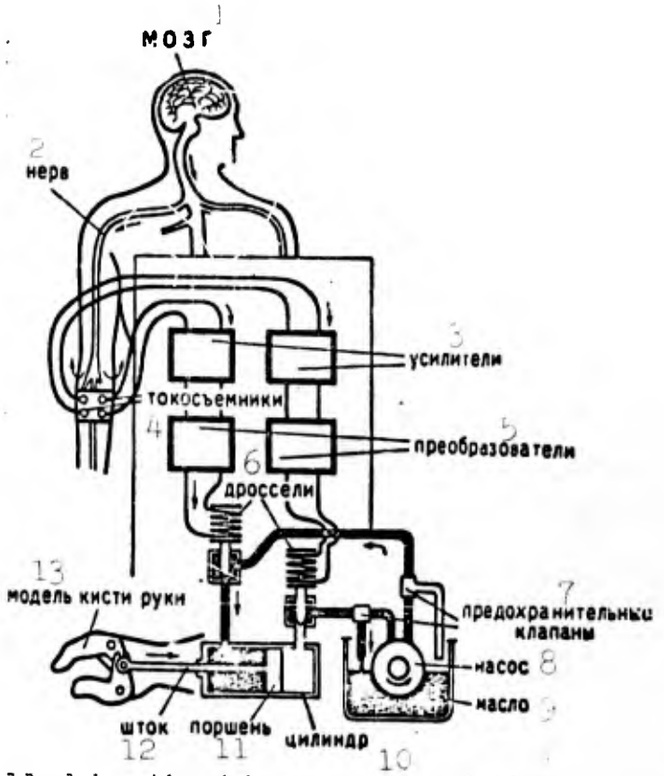


Electrical recording of the raising of table legs during spiritualistic seances. A) Two table legs (P) with drilled channels (T); the right leg rests on the floor and the left leg is raised. In the channel is a wooden rod (B), which bears against a metal disk (Z) resting on a strong spring (R). When the leg is lifted from the floor the spring pushes out the rod, while the metal disk completes an electric circuit at the contacts ($M$-$M^1$) and one of four electromagnetic recorders registers the raising of the leg on a kymogram. B) Kymogram. Simultaneous recording by all four sensors indicate that the entire table was lifted off the floor.

is nothing mysterious about this. I.M. Sechenov stated that a thought is a reflex inhibited to a greater or lesser extent in its final motor component, a reflex with its terminus weakened; the arc for this reflex passes through the neurons of the "psychic organ," the cerebral cortex.* Ideomotor actions are an excellent illustration of this idea of Sechenov's.

Precise experiments involving electrographic recording of excitatory impulses have now shown that the idea of a movement or of a visual object associated with a definite movement is accompanied by a rhythmic series of impulses in the muscles responsible for the imagined motion.** These impulses are transmitted to the muscles through the pyramidal tracts by those cortical neurons with whose activity the subject's motor idea is associated. For example, the mere notion of some tall object, say the spire of the Admiralty in Leningrad, is

accompanied by excitatory impulses in the ocular muscles whose contraction turns the eyeballs upward. When words are imagined (silent speech) the weak electric currents accompanying the excitatory impulses can also be picked up with a sufficiently sensitive galvanometer. For this purpose electrodes connected to the galvanometer must be applied to the lips, tongue, and laryngeal muscles, i.e., the organs of speech.




"Iron hand" controlled by the biocurrents of the muscles of a human hand. 1) Brain; 2) nerve; 3) amplifiers; 4) current pick-ups; 5) transformers; 6) springs; 7) safety valve; 8) pump; 9) oil; 10) cylinder; 11) piston; 12) rod; 13) model hand.

Not long ago bioelectric currents were ingeniously employed by workers at the Moscow Institute of Prosthetics and Prosthesis Design in a remarkable model of a functioning human hand. It was made of metal and had movable fingers. Its mechanism was connected by wires to a ring-like current pick-up fastened like a bracelet to the wrist of one of the individuals present. The mechanical hand executes the movements being imagined at the moment by the subject. For example, he

need only mentally clench his hand into a fist for the artificial hand to do the same. This technological "miracle" takes place in the following manner. When one thinks of a given movement, the brain sends excitatory impulses, i.e., bioelectric currents, to the appropriate muscles and causes them to contract. The biocurrents picked up from the subject's hand by the sensor are transmitted to an amplifier, which activates a special device that sets the fingers of the artificial hand in motion. The ideomotor actions of an individual can thus be used to control a machine, at present through wires and eventually, it must be assumed, without wires, by means of radio.*

Research by Soviet physiologists (V.V. Yefimova et al.) has shown that motor ideas not only induce biocurrents and weak contractions of the corresponding muscles, but are also accompanied by a change in the functional state of the muscles (an improvement of circulation and nutrient supply and an increase in excitability). Moreover, such ideas create a state of functional readiness in the entire complex of internal organs involved in cardiovascular, respiratory, and secretory activity; this state usually assumes participation in real functional actions. In this case central influences are transmitted through special sympathetic nerve fibers to the skeletal musculature and the internal organs.

It is remarkable that involuntary movements can be induced both by clearly conscious ideas and by motor or visual images that the subject is now aware he is experiencing at the moment. For example, during animated conversations some individuals mechanically draw various figures or write words and fragments of sentences, not knowing precisely what they have drawn or written. This has given rise to the most highly developed form of ideomotor actions, which is known as automatic writing. Spiritualists think very highly of this rarely encountered ability,

imagining that a "writing medium" acts under the inspiration of an external "spirit." In actuality, only the secret thoughts and desires, the forgotten and half-forgotten impressions of the writer appear in automatic writing.

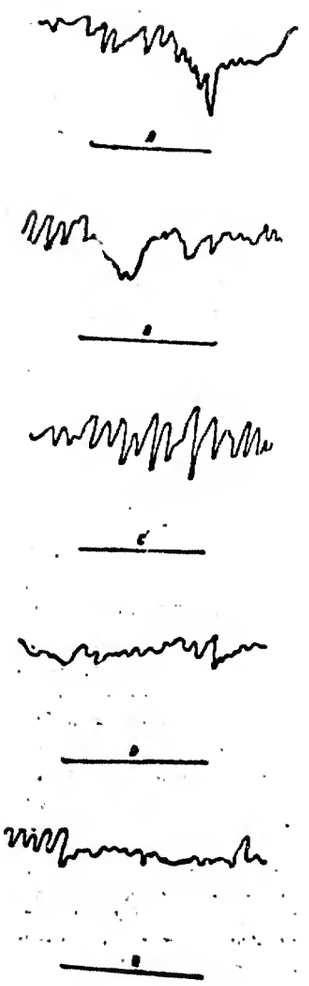
Ideomotor actions also explain another phenomenon that appears incomprehensible at first glance, that long known under the incorrect, confusing name of "mind reading." In modern times this phenomenon is demonstrated in public under the same name and gives naive spectators the impression of something new and unusual.* An experiment in "mind reading" is conducted in the following manner. The participants in the experiment (or one of them), with the reader (percipient) absent, thinks of some more or less complex action, e.g., finding a hidden object, doing something with it, or transfering it to somewhere else; the imaginary action can be very complex and involved. One of the percipients who knows the imaginary task then goes into contact with the reader: he takes him firmly by the arm near the wrist or holds one end of a taut cord, the other end of which is in the hands of the reader. The guide (conductor) must concentrate his full attention on the action the reader is to perform. The latter moves forward, now wavering and often changing direction and then going rapidly and decisively in the requisite direction. In this manner he gradually, step by step, performs the task, to the great amazement of the onlookers. How is this done?

Public demonstrations of this type were first given by the American Brown in 1874. His successors made the European public familiar with such experiments. Their success was sensational and attracted the attention of scientists. H. Byrd in America, W. Carpenter in England, and W. Preir in Germany independently discovered the secret of these spectacular experiments. In Russia the Society for Experi-

mental Psychology set up a special commission at the beginning of the eighteen-nineties to investigate these phenomena.* All were unanimous in the opinion that this was not "mind reading," but "reading of muscles." In other words, the reader was guided in his actions by the ideomotor signals involuntarily given him by the conductor, who was thinking concentratedly about the movements the reader must make and the direction in which he must go in order to perform the task. For example, the reader is to find a hidden object. If he does not go in the proper direction he feels a scarcely noticeable resistance on the part of the conductor. If he moves in the right direction the conductor goes freely, guiding the actions of the reader by impulses of which he is not aware and which are unnoticeable by the spectators.

Two conditions must be fulfilled for such experiments to be successful: the conductor must make sufficiently pronounced ideomotor movements and the reader must be sufficiently sensitive to scarcely perceptible motor signals that he can permit them to guide his actions. Writing on this topic, Preir says that he served as conductor for several famous "mind readers" and none of them were able to guess the task to be performed, since, knowing the secret, he tried to repress his ideomotor movements as far as was possible.

A capacity for ideomotor actions sufficient for successful conduct of such experiments can be detected beforehand by various methods, such as use of the pendulum mentioned previously in this chapter. For this purpose we employed a so-called pneumatic platform, which consisted of two triangular wooden pieces laid one above the other; wooden blocks were inserted between the two forward angles of the triangle, while under the third angle, which was at the subject's back when he was seated on the platform, was an elastic rubber bulb connected through a pneumatic line to a Marie capsule, a device known to all



Characteristics of ideomotor actions (bending the body backward while seated on a pneumatic platform) in different subjects (from the experiment of L. Vasil'yev and G. Belitskiy). The straight lines indicate the period during which the instructions were repeated.

physiologists. The lever of the capsule recorded a saw-tooth curve representing the involuntary rocking movements of the subject on a kymograph cylinder.* A rise in the curve corresponded to a forward movement and a drop in the curve to a backward movement. The subject was instructed: "Imagine that you are falling back, that you are being pulled backward." In many subjects (see Figure) the curve began to drop immediately (B) or gradually (A), which indicated that their ideomotor actions were quite pronounced. Such persons would be good conductors in "muscle reading" experiments. In other subjects the character

of the curve remained completely unchanged after the instructions were given (D) or showed intensified rocking in both directions (C), while in some cases there was even a distorted reaction, the rocking movements decreasing in amplitude (E). This means that these subjects exhibited a negative attitude toward the instructions given them and unconsciously suppressed even the weak rocking movements recorded before the instructions were given. Such subjects are understandably unsuitable for "muscle reading" experiments.*

That no "mind reading" occurred in the experiments described is also shown by the fact that the best reader was unable to do anything without contact with a conductor when confederates were excluded from the experiment. Experiments without contact are sometimes successful in public demonstrations, but there is no guarantee that they are conducted in an irreproachable manner without external aid.** Moreover, while performing the most complex motor tasks, readers refuse to execute the simplest task of an imagistic character. For example, stage "mind readers" are incapable of perceiving such imaginary visual images as "a red rose," "a white horse," or something similar, since even the most perfect recognition of ideomotor signals can be of no assistance.

Experiments involving "mind reading" and their scientific interpretation promoted a revival of interest in the phenomenon known as telepathy – the strange notion that the psychic experiences of one person can, under certain conditions, be transmitted to another person over a distance, a transmission occurring directly from brain to brain, without the participation of the external sense organs.

Idealists advance the phenomenon of thought transference as "proof" of the independence of the "psychic principle," the possibility that the psyche can exist outside the brain, independently of matter. In their opinion, a thought can be detached from the brain and, with-

out being subordinate to the categories of time, space, and causality or any of the laws of nature, be transmitted to another brain. This is "direct thought transference" or "mental suggestion." It is quite obvious that this theory is essentially the same as primitive animism and fundamentally conflicts with all the achievements of scientific physiology and psychology. These sciences have indisputably shown that thought, like the psyche itself, is merely a property of highly organized matter that arises when the latter reaches a definite degree of development and is therefore inseparable from its substrate, the brain, just as the whiteness of the sheet of paper lying in front me is inseparable from the paper itself.

From the idealistic standpoint, the problem of thought transference loses all scientific meaning and becomes a superstition. However, it must be said that there is another approach to this question; it contains nothing of the unscientific or mystical and can be verified by strictly controlled experiments. Leading scientists, physicists and neurologists who are in no way idealists (e.g., V.M. Bekhterev and P.P. Lazarev), have admitted the possibility of thought transference, assuming it to be like a "cerebral radio" resulting from the transmission of electromagnetic energy from one functioning brain to another. When one gives public lectures on such topics as "Sleep and Dreams," "Hypnosis and Suggestion," or "The Brain and the Psyche," a near majority of the questions asked by the audience touch on precisely this problem of whether telepathy is possible, whether a "mental radio" exists. The questionner often cites "remarkable cases" from his own experience or that of his relatives and friends, sometimes setting them forth with a clear coating of religious or occult ideas.

I therefore feel it necessary to devote the next chapter to a discussion of the current solution to the scientific problem of thought

transference and the superstitious ideas associated with it.

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[Footnotes]

90 See I.R. Tarkhanov, Dukh i telo [Mind and Body], St. Petersburg, 1904, pages 9-11 and 63-65.

91 Chevrel at first (in 1812) gave the following explanation of the movement of the pendulum: "There is a relationship between certain movements and thought, although this thought is not the will that controls the muscular organs.

93 A. Lemann, Illyustrirovannaya istoriya suyeveriy i volshebstva ot drevnosti do nashikh dney [Illustrated History of Superstition and Magic from Antiquity to the Present Day], page 443.

94 For an illustration and detailed description of the manometric table see D.I. Mendeleyev, Materialy dlya suzhdeniya o spiritizme [Materials for an Evaluation of Spiritualism].

95 K. Marx and F. Engels, Soch. [Collected Works], Vol. 20, pages 382 and 383.

95 For more detail on this see M. Shakhnovich's article Sotsial'nyye korni spiritizma [The Social Roots of Spiritualism] in the Journal Voinstvuyushchiy ateizm [Militant Atheism], 1931, No. 11, page 21.

96 See I.M. Sechenov, Izbrannyye trudy [Selected Works], Moscow, 1935, page 167.

96 E. Jacobson, Electrical measurements of neuromuscular states during mental activities, American Journal of Physiology, Vol. 91, 9130, page 567.

98 See the Article Biotok uprablyayet mashinoy [Biocurrents Control a Machine] in Izvestiya, 6 September 1958; for more detail see the magazine Tekhnika-molodezhi [Young Engineer], 1958, No. 4, A Scientific discussion of this problem is presented in A.Ye. Kobrinskiy's article Ispol'zovaniye biotokov dlya tseley upravleniya [Use of Biocurrents for Control Purposes], Izvestiya Akademii nauk SSSR, OTN, Energetika i avtomatika [News of the Academy of Sciences USSR, Department of Technical Sciences, Energetics and Automation], 1959, No. 3, page 151.

99 In prerevolutionary Russia the noted hypnotist O.I. Fel'dman conducted these experiments with great success. The demonstrations of V. Messing and M. Kun' also achieved wide popularity here.

101 For a detailed description of the pneumatic platform, see A.I. Bronshteyn's article, K metodike registratsii dvigatel'-noy reaktsii u cheloveka [A Method of Recording Human Motor Reactions] in the collection Voprosy izucheniya i vospitaniya lichnosti [Problems in the Study and Training of Personality], Trudy Instituta mosga [Transactions of the Institute of the Brain], Nos. I-II, Leningrad, 1930, page 98.

102 See L.L. Vasil'yev and G.Yu. Belitskiy, O tipakh protekaniya ideomotornoy reaktsii [Types of Ideomotor Reactions], Byul-leten' eksperimental'noy biologii i meditsiny [Bulletin of Experimental Biology and Medicine], Vol. 17, No. 1-2, 1944, page 26.

102 V.G. Messing gives another explanation for this: "I have often performed mental feats without being in direct contact with the conductor and even when blindfolded. Here I can be guided by the conductor's respiration and pulse rates, the tone of his voice, his gait, etc." See the interview with Messing entitled, "Chteniye muskulov, a ne myskey [Muscle Reading, Not Mind Reading], Tekhnika-molodezhi [Young En-gineer], 1961, No. 1, page 32.

## 6. IS THERE A "MENTAL RADIO"?

In works of fiction, biographies of famous persons, historical memoirs, and magazine and newspaper articles there have appeared during almost all eras and in almost all nations descriptions of various cases from everyday life designated by the terms "telepathy," "direct thought transference," "mental suggestion," "mental radio," etc. These cases can be expressed by the following general formula: if at a given moment an individual A dies, is exposed to mortal danger, or experiences some important, disturbing event, another individual (let us call him B) linked to him by a bond of kinship, love, or friendship and in a distant place simultaneously enters a mental state that somehow reflects what is happening to A.

Descriptions of such cases are very often couched in a mystical form and are interpreted as a mysterious "warning" that the "soul" of someone close to the percipient is ready to pass on to a "better world." It is therefore not surprising that telepathy was long regarded as an object of faith rather than of knowledge and science. It was only during the second half of the 19th century that scientists, albeit a very few, began to become interested in this problem. The starting point must be considered to be 1876, when the noted British physicist W. Barret and the scientist M. Faraday and W. Tyndall presented a paper on "direct thought transference" to a meeting of the British Association of Scientists. Systematic investigations of the so-called spontaneous telepathy observed in everyday life were then undertaken. The Society for Psychical Research (which still exists) was founded in London in

1882 for this purpose. Every case of spontaneous telepathy is very carefully studied by the members of the Society, who record written documents and the testimony of witnesses, and only cases confirmed in this manner are given consideration. Similar societies were subsequently established in many other nations of Europe, America, and Asia. The International Committee for Psychical Research was formed in 1920 and organized several congresses at which numerous papers on mysterious phenomena in the human psyche, particularly telepathy, were presented.

The interest in telepathic phenomena in the capitalistic countries did not fade, but increased with time, being reinforced by widely held religious beliefs. It must be acknowledged, however, that this interest was also very strong in Russia. To some extent it has been supported by works in both classical and contemporary Soviet literature. I could point out many pages in which events of a clearly telepathic nature are recounted with great impressiveness. For example, an essay by N. Kal'ma entitled "Two Mothers," which appeared in the magazine "Ogonek" [Light] (No. 7, 1941), presented O.O. Ostrovskaya's unsophisticated account of her "premonition" of the death of her son, the well-known Soviet writer Nikolay Ostrovskiy. This account is quite typical of cases referred to as spontaneous telepathy and will consequently be reproduced in full:

"I am a simple peasant, so do not be offended if I recount my dream to you. I was asleep in my home at Sochi and had a dream: aircraft were flying over the sea, many aircraft, and roaring, roaring, hurting my ears. I understood that this was the beginning of the war. I ran out of the house and saw Kolya standing before me, completely healthy, wearing an overcoat, and with a helmet and rifle in his hand. Around him were trenches, foxholes, and tangled barbed wire. I wanted to ask Kolya about the war, but I understood that he was on watch,

which meant that I could not ask him. I wanted to return to the house, but the pit grew ever wider, the barbed wire caught at my legs, and I could not go. I wanted to shout but couldn't.

Then I woke up and thought: I suppose I dreamed of something bad that happened to Kolya in Moscow. I thought: I will get tickets and go to Kolya in Moscow. I had made up my mind to go for a ticket, when suddenly I received a letter from Kolya. He wrote that he was better, that he would soon return, and that in the spring we would be living together. I read it, but my depression did not disappear. I said to myself: now where, old woman, are you to go and for what, since Kolya writes that all is well? And I did not go after a ticket.

In the evening I easily fell asleep (it was already eleven o'clock) and then heard a knocking:

"Ol'ga Osipovna, are you sleeping?"

'I'm asleep,' I said, but, from his voice, I recognized someone I knew from the town committee.

'Get up,' he said, 'Kolya is worse and we want to send you to Moscow.'

Then my heart sank to my knees and I could only lie there and tell him that the evening train had already gone and I would have to wait a day for the next one.

'That's alright, we'll take you to the trolley,' he said.

I knew that this would be too bumpy and refused outright. Then he came closer to the door and said:

'Kolya is dead, no more Kolya!' and began to cry..."

Hundreds of similar cases have been described.* For purposes of comparison we will present one more, taken from the documents of the aforementioned London Society: "On the day of his death my father, as usual, left the house at half-past two to walk in the garden and

the fields. No more than 7 or 8 minutes had passed when I, conversing with my wife and sister, suddenly felt a strong desire to go to my father. (Our conversation had dealt with a neighbor we proposed to visit after dinner and we did not mention my father at all.) The conviction that I should go to him became overpowering. I insisted that everyone in the house go out to look for him. I was told that my anxiety was completely foolish, but the search was begun and my father was actually found dead."*

How are we to treat accounts of this type? First of all, it must be strongly emphasized that they are in no way obligatorily associated with death or with other powerful psychic experiences undergone by persons close to the percipient. Cases have been described of apparently telepathic transmission of the most banal, totally untragic details of everyday life. The following is an example taken from the collection of the same London society (case No. 56): "One morning not long ago, when I was occupied with light work, I mentally pictured a small withe basket in which lay five eggs, two of which were very clean, more so than usually, elongated, and yellowish in color; one was completely round and white, but dirty, while the other two had no distinctive marks. I asked myself of what significance this sudden, trifling image could be. I had never thought of such things. However, this basket settled in my mind and occupied it for several minutes.

About two hours later I went to breakfast in another room. I was immediately struck by the remarkable similarity between the eggs standing in glasses on the table and the two elongated ones that I had just visualized. 'Why are you staring at these eggs?' my wife asked me and was greatly astounded to learn from me the number of eggs her mother had sent her a half-hour previously. She fetched the other three eggs: I saw the dirty egg and the familiar basket. Then I learned

that these eggs had been gathered by my mother-in-law, who had placed them in the basket and sent them to me. She herself later said that she was naturally thinking of me at the time. This took place at 1:00 AM and, judging from my habits, at precisely the moment when the idea of the eggs occurred to me."

Many such "apparently trivial" occurrences from his own life are described in a series of articles entitled "Transmission of Thought at a Distance" by the noted American humorist Mark Twain; his treatment of these happenings is in no way humorous, however, but entirely serious.* The writer was especially intrigued by the "premonitions of a meeting with an acquaintance" that he often had: suddenly, without rhyme or reason, he would remember some male or female acquaintance. A minute would pass, then another, and he would come face to face with precisely this person. Such coincidences sometimes take the form of an illusion, a "false recognition": a strange individual walking toward one is for some reason mistaken for a thoroughly familiar person, N. It then turns out that the individual encountered is not N and does not even bear any resemblance to him. One continues for several dozen strides and there is the true, genuine N.

Such a situation has been depicted in psychologically accurate terms by I.S. Turgenev in his novel "Smoke." After breaking off with his fiance, "Litvinov had only one thing in mind: to see Irina; he set out to meet her." He did not find her, however, and "drifted away" "hollow, like a tambourine": fragmentary thoughts and memories succeeded one another at random... "But then something was wafted to him, something intangible and unquestionable; had it been a whiff of a falling shadow it would have been no more imperceptible, but he immediately sensed that Irina was approaching. She actually appeared a vew steps away, within reach, accompanied by another woman; their eyes

met."*

It is possible that something similar has happened to some of our readers, but can this everyday occurrence serve as scientific proof of the existence of telepathy, "mental radio"? It naturally cannot. This is because in all such cases we cannot eliminate the possibility of a fortuitous temporal coincidence of two similar events, one happening to one person and the other involving some other person and taking place at roughly the same time. Events so improbable sometimes occur in everyday life that, even if a telepathic link existed, it could have played any part. Over a period of two decades I recorded in a special notebook 34 such incredible coincidences from my own life. All of them are more or less of the same type: the following can serve as an example.

"On 17 January 1940 I was reading that day's issue of the newspaper "Leningrad Pravda" and at the same time listening with half an ear to what the announcer was saying on the radio. I began to read an article on the first page of the newspaper headed "High Award." This story listed the surnames of soldiers and officers (a total of 6 names) who had distinguished themselves in battles with the White Fins. Among them my eye was struck by the name Mazepa, which is quite rare in this day, and at precisely the same moment the announcer uttered the same name — Mazepa (he was reading the theatre programs for the next day and among the other attractions was Tchaichovskiy's opera "Mazepa")."

Members of the audience at lectures on mysterious psychic phenomena often seek to support their claims of the existence of thought transference by citing travelers' reports of the tricks of Indian "fakirs." Accounts of such tricks have often appeared in the press. Here, for example, is an eye-witness report given by Vice-admiral A.N.

Skalovskiy of the Czarist navy in his book "Mikrokosmos i Makrokosmos" [Microcosm and Macrocosm]:

"Sitting on the deck (of a Russian warship – Author), surrounded on all sides by onlookers, the fakir takes a pot apparently containing some sort of earth. Covering the pot with a shawl in the presence of the audience, he manipulates something over it with his hands for 10-15 minutes, as though he were vigorously squeezing something. Earnest concentration and strain are written on his face. Then he draws his hands out from under the shawl and the astounded spectators see it rise higher and higher; after a time the fakir pulls away the shawl and the audience sees that some sort of bush has grown in the pot. At this point he asks for a pitcher of water and pours sand into the bottom if it. In full view of all, he then takes from the bottom a handful of the soaking sand and vigorously squeezes it, his face showing strain and concentration; it can be seen that he is making a tremendous effort. Then he opens his hands and they are completely dry; the handful of sand is as dry as dust. The author has personally seen these tricks."* To this we might add that it has never been possible to record such phenomena on photographic film.


Cards with Zener figures for testing the capacity for "extrasensory perception."

The Swedish physician and hypnologist J. Bjoerkhem reproduced in patients in a hypnotic trance all the complex, successive hallucinations that Indian fakirs induce in their audience. The following is a record of one of Bjoerkhem's experiments.

"R.S. went under. A deep, tranquil trance. I ordered him (the subject – Author) to open his eyes and made several suggestions to him. At first he saw a small ordinary twig on the table. It began to grow and finally became a tree, from which reddish buds emerged. It was an apple tree. Then the petals began to fall and R.S. caught several of them in his hand. Green fruit formed from the flowers. The apples gradually grew and took on color, finally being red and ripe. R.S. walked over to the tree and reached out for an apple. In actuality, he grasped a light bulb hanging on a cord and brought it to his mouth as though he were about to eat the imaginary apple with great relish. At the end of the experiment I ordered the tree to disappear and R.S. was very surprised that it was no longer there."* All this is outwardly similar to the experience with a fakir described by A.N. Skalovskiy, the important difference being that the admiral did not understand the fakir's words (if he uttered any), while R.S. understood perfectly what Dr. Bjoerkhem suggested to him in his native Swedish.

The tricks of fakirs, like any other tricks, naturally cannot be sufficient proof of the existence of "mental radio." A scientific solution to this problem can be obtained only by experiments in thought transference conducted in accordance with the rules of modern science. Such experiments were begun by psychiatrists, physiologists, and physicists at the end of the last century. At first the procedures for experimental telepathy were very simple and were applied to large numbers of subjects, the results obtained being processed by the methods

of probability theory. For example, the noted French physiologist Charles Richet* carried out many experiments involving guessing of mentally visualized playing cards. According to his data, the number of correct guesses always exceeded the number predicted by probability, although only slightly. For example, for 2997 trials the predicted number of successful guesses was 732, while the actual number was 789. A more significant result was obtained for only a few uncommon subjects. This type of experiment led to the conclusion that not all individuals are open to mental suggestion (as is the case for verbal suggestion) and that it is necessary to select the most suitable, most suggestible persons for experimentation.

Richet's experiments utilizing probability theory have been extended in England (Dr. Sewell) and the United States (Dr. Rhine), although these investigations differ in that they use cards with five clearly distinguishable black figures on a white background instead of ordinary playing cards. Each card bears a square, a circle, wavy lines, a star, or a cross. A deck of 25 such cards is used in the experiments, each figure being repeated 5 times. The cards were suggested by Dr. Zener, a colleague of Rhine's, and are now employed on an international scale. Telepathic experiments with Zener cards have been conducted in various nations. The results of these identical experiments can easily be compared.

The person making the suggestion (inductor) and the individual receiving it (percipient) are seated at a table facing one another. They are separated by a cardboard or plywood screen 18 by 24 inches in size in the center of the table; which prevents the percipient from seeing the experimenter and the deck of cards in his hand. The experimenter thoroughly shuffles the cards (no less than 4 or 5 times) and explains to the percipient that he is to guess the cards and record



The subject (left) points out the figure suggested by the experimenter (photograph from Dr. Rhine's laboratory).

his responses on the answer sheet in front of him.

When the percipient signals (verbally or by tapping on the table) that he is ready for the experiment, the inductor immediately takes the top card from the deck and looks at it. The percipient records his guess on the answer sheet and again gives the signal. The inductor places the first card face down on the table, takes the second card from the deck, and looks at it until the percipient gives the next signal; this procedure is repeated for the remainder of the experiment. The inductor then records the sequence of the cards, compares his list with the percipient's answer sheet, and notes the number of successful guesses. This is done with the percipient's participation, which sustains his interest in the rather monotonous experiment.

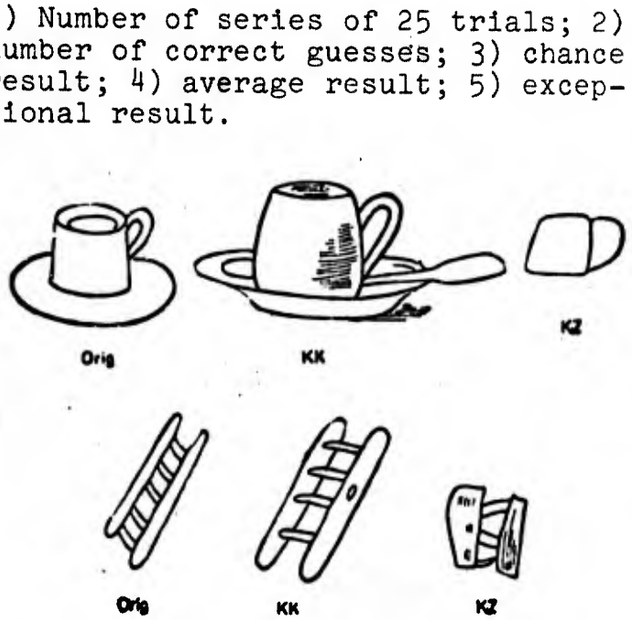
Each experiment (or series) thus consists of 25 trials. A minimum of four such series, with sufficiently long breaks to avoid fatigue, must be conducted with each subject, although 10 or more series furnish more reliable results. Much depends on the experimental conditions. Each series of trials must be conducted at the rate preferred

by the percipient; he cannot be held to too fast or too slow a tempo. The subject should be interested and confident of success; if this is not the case the experimenter must try to get him to strive for success – a result above the chance level.

The mean successful-trial level due to chance alone is 20%, or 5 correct guesses in 25 cards. A total of 20 correct guesses would consequently be the chance level for 4 series (100 trials). The percipient's success is evaluated from the number of correct trials above the chance level. The table below, compiled on the basis of probability theory, makes it possible to determine the successfulness of the results obtained.

| 1 Число серий из 25 проб | 2 Число совпадений | | |
|---|---|---|---|
| | 3 случайный результат | 4 средний результат | 5 отличный результат |
| 4 | 20 | 28 | 32 |
| 10 | 50 | 63 | 69 |
| 50 | 250 | 279 | 293 |
| 100 | 500 | 540 | 560 |

1) Number of series of 25 trials; 2) number of correct guesses; 3) chance result; 4) average result; 5) exceptional result.




Dr. Bruck's experiment in the mental suggestion of drawings. Orig) Drawing suggested by the experimenter; KK and KZ) figures drawn by two subjects in the same experiment.

When all these conditions were observed, American and English parapsychologists repeatedly obtained correct-trial figures above the probability level in large series of experiments. For example, in tests with two young cousins (one of whom was the inductor and the other the percipient), Sewell conducted 15 thousand trials and obtained an average of 9 correct guesses for each deck of 25 cards instead of the 5 successes predicted by probability theory. In these experiments all 25 cards were guessed in sequence 2 times, 24 cards were guessed 4 times, and from 19 to 23 cards were guessed 40 times. These results greatly exceeded those predicted by probability theory. Thus, for example, the probability of a chance guessing of 25 cards in sequence is negligible: this result can be expected once in $5^{25}$ trials ($5^{25}$ = = 298,023,223,876,953,125 – a truly astronomical number!).

Individual very suggestible subjects can also receive mental suggestions of more complex visual objects, such as drawings, various articles, words, etc. (not just five figures known beforehand, as in the experiments with Zener cards, but a completely unlimited number).

The subject is instructed to draw on paper or describe verbally all the visual images that pass through his mind during the experiment. The following is an account of a successful experiment of this type, taken from Dr. Tischner's book.* The subject was placed behind a screen and curtained off with a large piece of cloth. The suggestor sat with his back to the screen, several meters away from it. There were no mirrors or other reflective surfaces in the room. The experiment was conducted by Dr. Tischner, who handed the suggestor some object and then recorded the verbal responses of the subject while observing the behavior of both participants. Here we quote from the record of the experiment:

"The object of the mental suggestion was a pair of scissors. The

experiment began at 8:14 AM. After two minutes the subject began to speak: 'This seems very large to me. I am still too preoccupied by my own thoughts... now it appears to me to be a small, narrow, short object... something twisted like a corkscrew... perhaps a knife or something of that sort. It seems very hard for me to recognize it... Unfortunately, I am very badly distracted... My impressions of the day crowd in on me. Now I see an image of Frau Tischner. Is it a coin? (Dr. Tischner answered that it was not). Now it's like something round and shining... Is it always shiny?... Now it looks like a ring... it seems to be metal again... It shines like glass or metal... Round, but elongated... I see two round pieces and then it's elongated... It must be a pair of scissors.' The subject then immediately (at 8:25) repeated, with an expression of certainty: 'It's a pair of scissors!'"

These experiments are characterized by the fact that the suggested image appears in the percipient's consciousness little by little, with errors and inaccuracies, and only gradually becomes more or less clear. Often only an approximate, symbolic description or depiction of the object visualized is given (see Dr. Bruck's experiment*).

Certain mechanical devices are sometimes employed to facilitate these experiments, e.g., the percipient is given a pencil or a so-called planchette. The latter is a small, easily moved board mounted on three legs, one of which is a sharpened pencil. The planchette is placed on a large sheet of paper; a subject capable of making automatic movements rests his hand on it and uses it to record automatically and unconsciously that which is suggested to him mentally by the experimenter.

Of the many investigations of this type, the best known were the experiments of the American writer Upton Sinclair on the mental suggestion of drawings to his wife Mary. Sinclair described these experiments

in his book "Mental Radio,"* which attracted the attention of the prominent American physiologist MacDougal, the parapsychologist Walter Prince, and other scientists. Prince wrote a book in which he presented data to verify the reliability of Sinclair's experiments, as well as the testimony of spectators to and participants in them.** Sinclair was not the only inductor, a relative of the percipient serving this function in certain experiments. The mental suggestions were given from another room and, in some experiments, from another house 30 miles away.*** These experiments were especially successful when Mary was, in her own words, "on the edge of sleep" and the suggested figures appeared in her drowsy consciousness in the form of visual images.

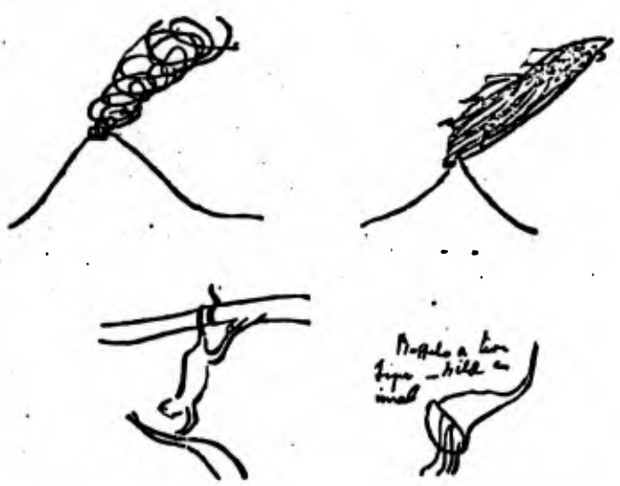
It must be pointed out that experiments of this type are not subject to strict statistical processing and consequently cannot establish the existence of mental suggestion as conclusively as quantitative experiments with Zener cards. On the other hand, when supported by the results of card experiments, investigations of the mental transmission of drawings are of more aid in clarifying the psychological characteristics of telepathic perception. Errors made by the percipient in depicting or recognizing the drawings visualized by the inductor are especially instructive in this respect. Here are two examples from Sinclair's book.

The inductor draws a smoking volcano; the percipient depicts the same thing, but calls her drawing something entirely different: "a large black beetle with horns." The word is divorced from the thing! There are many similar examples in the book. What do they indicate? Undoubtedly that it is a visual image that is perceived telepathically, not a concept, a word, or a thought in the precise meaning of the term.

Such cases can be referred to as telepathic reproduction without recognition of the figure visualized by the inductor, but cases of the

opposite type are also common, i.e., telepathic recognition without reproduction of the figure visualized by the inductor. The following is an example of this from the same source. A drawing of a monkey climbing from one branch to another was suggested mentally. The percipient did not reproduce this rather complex drawing, but recognized the category of images to which it belonged. She wrote: "a buffalo or lion, a tiger – a wild animal."

Experiments involving mental trance induction and awakening of the percipient indicate the same thing. The prominent Soviet hypnologist K.I. Platonov, who conducted many experiments of this type, wrote: "It is important to note that when I trid to influence the subject by giving the mental command "sleep! sleep!" I never obtained any response. However, when I presented him with a visual image of a sleeping figure (or an awakening figure for the mental suggestion to wake up) the effect on the subject was always positive."*



Two of Upton Sinclair's experiments on the mental suggestion of drawings to his wife. The drawings suggested are on the left and the drawings made by the percipient on the right.

This means that the frequently used expression "thought transference" and "mental suggestion" are inaccurate. Only visual and, less commonly, auditory images, feelings, and impulsions to action, i.e.,

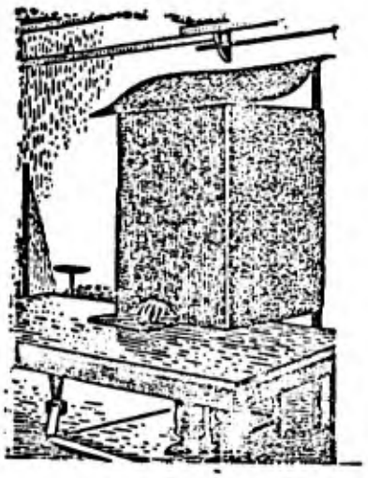
those things which I.P. Pavlov assigned to the first signal system, can be transmitted telepathically, while thoughts, which are associated with words and the second signal system, cannot.

This enables us to understand how telepathic experiments can be successful in cases where, for example, the inductor is French and the percipient Greek, the former not knowing a word of Greek nor the latter a word of French. Experiments in the telepathic transmission of drawings have been conducted at the international level and have yielded results that merit attention.*

The chief methodological condition for all these experiments is that the possibility of perception of the mentally transmitted image by ordinary means, through the sense organs, must be reliably excluded. Thus, for example, Dr. H. Brughmans conducted the following experiments under rather complex conditions in the psychology laboratory of Groeningen University (Holland). Two rooms, one above the other, were specially adapted for this purpose. In the floor of the darkened upper room was an observation window with thick double glass, which did not permit even loud sound to pass between the two rooms. Through the window the experimenters in the upper room could observe what took plac in the brightly lit lower room, in which the subject was placed. The percipient could not see the experimenters, since during the test he was seated in a special covered-like booth closed at the top, front, and sides. In front of the booth,directly beneath the window, stood a table on which was a piece of cardboard laid out like a chessboard with 48 large squares, in each of which was a chess symbol. Tne subject's hand rested on this board, passing through a horizontal slit in the front wall of the booth. The subject thus could not see the board, while the experimenters were able to watch his hand without seeing him.

In each trial the experimenters, looking down on the board and

the subject's hand, mentally suggested that he move his hand from one square to another, e.g., from square a2 to square c5. The square to which the subject was to move his hand was selected by lot each time. During these experiments one subject, a student, attracted special attention. In 60 of 187 trials he correctly pointed out the suggested square, a success ratio of 31%. In another series of identical experiments in which the subject was given a drug that increased the excitability of his cerebral cortex, he raised his score to 75%.



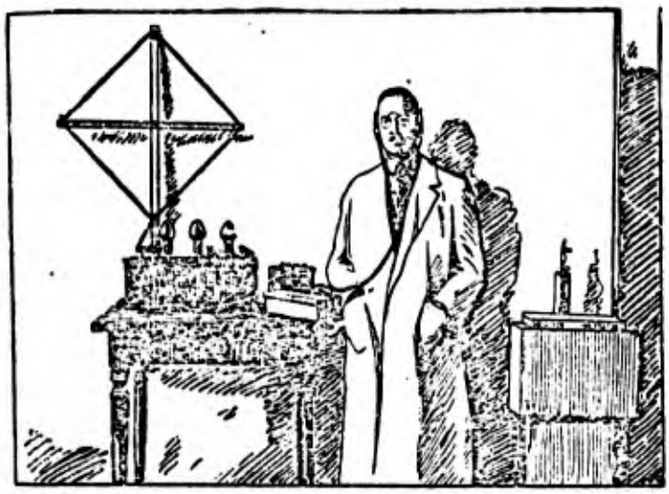
Set-up of Dr. Brughmans' experiments on the mental suggestion of hand movements at Groeningen University.

These experiments, a description of which was published in 1922, became widely known. Similar investigations were conducted in many countries and a department for the specific study of such psychic phenomena was established at one of the Dutch universities (in the city of Utrecht). In the United States, England, and certain other nations special laboratories have been established for the same purpose, dissertations on this subject have been defended, and conferences (symposia) have been held to discuss similar problems of the human brain and psyche.*

The development of scientific interest in the question of mental suggestion was greatly promoted by H. Hertz's discovery of electromagnetic waves (in 1888) and the subsequent success of wireless telegraphy (A.S. Popov) and modern radio broadcasting. This was the origin of the term "mental radio." In discussing this topic Academician P.P. Lazarev wrote:

"The periodic (chemical – Author) reactions occurring in the (cerebral – Author) centers must betray the existence of electromotive forces in the vicinity of these centers. The latter, giving rise to electrical phenomena at the surface of the head, must, according to the electromagnetic theory of light, be accompanied by electromagnetic waves that propagate at the speed of light through the surrounding medium. Any sensation, any act of movement must produce waves and the human brain must radiate long waves (up to 30,000 kilometers) into the surrounding medium. It is difficult to say what physiological role these waves play, but it is possible that they can explain suggestion (Here Lazarev is obviously speaking only of nonverbal, mental suggestion – Author) and other, more complex phenomena in the psychic realm."

These statements, made by Academician P.P. Lazarev in 1922*, soon received a certain amount of factual substantiation. Varying electrical potentials, which can be amplified and recorded with an oscillograph in the form of a so-called electroencephalogram, were actually discovered at the surface of the human head.** Electroencephalography has now entered medical practice as a technique that aids in the correct diagnosis of certain brain diseases. The long-term investigations conducted by the Italian neurologist F. Cazzamalli in conjunction with physicists between 1923 and 1958 led him to claim that he had discovered electromagnetic waves with lengths of the order of a centimeter in the space surrounding a subject's head.



Prof. Cazzamalli near the screening chamber for experiments on the reception of electromagnetic waves from the brain (from a rare pnotograph).

For his experiments Cazzamalli built an insulated chamber on the principle of the Faraday cell. It consisted of a wooden framework in the form of a parallelipiped, whose six faces were covered with lead sheet 1.5 millimeters thick. Control experiments showed that lead walls reliably shielded the interior of the chamber from external radio waves, with which the earth's atmosphere is filled in modern times. In the ceiling was an opening closed by a special lock, through which the subject entered the chamber. A person having high suggestibility and capable of going into a deep hypnotic trance served as the subject. In the chamber was a cot, a table, a chair, and a sensitive radio receiver tuned to receive meter, decimeter, and centimeter waves through an antenna suspended from the ceiling and directed at the subject. The receiver was connected to a double headset worn by the experimenter, who was also in the chamber or, in some experiments, outside it.

The radio receiver did not pick up any signals while the subject was awake. However, as soon as he was placed in a hypnotic trance and a state of emotional excitation was induced by a verbal suggestion (e.g., by a suggested hallucination) sounds indicating generation of

radio waves within the chamber were heard in the headset. These sounds were very diverse in character, ranging from roars, crackles, and whistles to musical tones reminiscent of a cello, a flute, or the human voice. Normal mental functioning also had some effect on the receiver when it involved a great deal of tension. Cazzamalli substituted a string galvanometer for the headset and this made it possible to obtain a graphic record of the radio waves produced by the brain on photographic film.

On the basis of these experiments Cazzamalli arrived at the following conclusions. During intense activity the human brain becomes a source of meter, decimeter, and centimeter waves (particularly the two latter types). The cerebral radio waves are sometimes aperiodic, i.e., have a varying wavelength, or resemble damped waves. They sometimes appear as unattenuated waves of a definite frequency for brief periods. In Cazzamalli's opinion, cerebral radio waves may be the physical agent that transmits mental suggestions from the experimenter's brain to the subject's brain.*

Cazzamalli's experiments and theoretical conclusions and their possible significance for physiology and psychology aroused much interest, but there were also a number of criticisms in the Soviet and foreign scientific press. For example, a critical review of these experiments from the standpoint of physics can be found in an article by Prof. A.A. Petrovskiy.** An attempt was made at the Leningrad Institute of the Brain imeni V.M. Bekhterev to repeat Cazzamalli's experiments, in which the author of this book participated; no positive results were obtained. We do not know whether any foreign investigators have been successful in this. We can only point out that two German physicists*** were able to detect a low-frequency electromagnetic field near contracted muscles in humans and animals. The field was picked up

with a sensor disk connected to a string galvanometer through a three-tube amplifier. The frequency of the oscillations recorded on the photographic film corresponded to the rhythm of the biocurrents reaching the contracted muscles from the central nervous system (approximately 50 Hz). This frequency is equivalent to electromagnetic waves of enormous length, about 6 thousand kilometers, which P.P. Lazarev believes to be the physical agent that may be responsible for mental suggestion.

There were thus two views on the question of the form in which electromagnetic energy is produced by the functioning brain and the manner in which it enters the surrounding medium and, penetrating another brain, induces definite neuropsychological processes in it: according to Lazarev, the agent involved is low-frequency electromagnetic waves of enormous length, while according to Cazzamalli it is superhigh-frequency waves of very short length. If we acknowledge that both types of cerebral waves exist, there is still the question of whether they are capable of stimulating the cortex of another brain and thus inducing neuropsychological processes in it directly, without the participation of the sense organs.

The following data are available on this problem. The work of the noted physiologist V.Ya. Danilevskiy showed that exposure to low-frequency (50-100 Hz) electromagnetic fields can stimulate nerves and muscles isolated from the body at a distance and also increase the excitability of the central nervous system in animals and humans.* Our laboratory was recently successful in developing a conditioned reflex to an imperceptible low-frequency (200 Hz) electromagnetic field in healthy subjects.** This means that this physical agent is capable of influencing the "organ of the psyche," the cerebral cortex. Similar data have also been obtained for superhigh-frequency electromagnetic fields, although the mechanism of their action on living tissue differs

radically from that of the action of low-frequency fields. Thus, one of P.P. Lazarev's followers employed the adaptometric method to establish that there was a sharp rise in the sensitivity of the nervous system under the action of centimeter waves.* The latest data on this problem can be found in the collection of papers on experimental work conducted under the supervision of Prof. A.V. Triumfov.**

Low- and high-frequency electromagnetic waves can act on the brain in this manner only when their power reaches the threshold level, as the physiologists say, i.e., that intensity at which the neural processes they induce can be subjectively perceived by the individual. The Soviet physicist V.K. Arkad'yev has called attention to this. On the basis of mathematical calculations, he concluded that the power of the electromagnetic field set up by the biocurrents of the functioning brain is very low and does not reach the threshold level. They are substantially less powerful than the electromagnetic fields generated in the electrical devices and wires among which man lives and works. V.K. Arkad'yev therefore regards the electromagnetic hypothesis for mental suggestion as invalid.***

The validity of this hypothesis can be confirmed or refuted by still another method, by screening the suggestor (experimenter) or percipient (subject) with metal. This technique was first employed in the Soviet Union by the electrical engineer B.B. Kazhinskiy. According to his data, screening with metal prevents the transmission of mental suggestions. The same result was also obtained by the physicist S.Ya. Turlygin.****

To B.B. Kazhinskiy's credit is the fact that he was the first to attempt to answer the question of how the structural elements of nerve tissue can generate high-frequency electromagnetic waves. He pointed out that, in electronics, such waves are produced with a closed AC os-

cillator circuit containing a capacitor and a solenoid coil and having a certain resistance. Alternating current is the basis of the neural generation of biocurrents in the nervous system. Kazhinskiy regards the endings of the dendrites, which are plate-like in form, as cellular capacitors and the coiled nerve fibers as solenoids connected in series in a closed oscillatory circuit; he treats this entire system as a cellular vibrator that generates electromagnetic waves of the corresponding length.*

On the basis of these hypotheses, the prominent histophysiologist Academician A.V. Leontovich, working in conjunction with his son, an electrical engineer, attempted to make a theoretical calculation of the length of the electromagnetic waves generated by the cerebral cellular vibrators, taking into account the electromotive force of the biocurrents, the possible capacitance of the cellular capacitors, the resistance of the nerve fibers, etc. The results of these calculations were in rather good agreement with the range of wavelengths determined for the cerebral radio waves in F. Cazzamalli's experiments.**

However, there are also contradictory experimental data showing that screening of the inductor and percipient with iron or lead chambers having walls 1-3 millimeters thick did not prevent or even noticeably attenuate the transmission of mental suggestions in the sleeping or waking state.*** Such chambers do not pass short (centimeter and meter) waves and considerably attenuate long (kilometer) waves. This casts doubt on the validity of the hypothesis of the electromagnetic nature of suggestion at a distance, but does not preclude the possibility that the functioning human brain sets up some sort of material field or produces some sort of energy that effects this process.

All the material presented in this chapter indicates that the results achieved to date in investigating mental suggestion and in ex-

plaining it from the standpoint of the electromagnetic influence of one brain on another do not enable us to draw any definite conclusion. Let us assume, however, that we will eventually be able to do so, to show that under certain favorable conditions, albeit ones rarely encountered, one brain can become a transmitter for electromagnetic or some other, still unknown waves, while another brain becomes a receiver. Let us also assume that the waves received are capable of inducing corresponding neuropsychological processes in the cortex. The question has been asked as to whether this is detrimental to the materialistic world-view and to the generally accepted premises of physiology. Such is obviously not the case.* Quite the contrary, a new field of phenomena is opened up for physiological research and materialistic scientific analysis is given a powerful weapon to crush certain mystical ideas that have been difficult to root out.

I wish to conclude this chapter with an excerpt from the last article written by Norbert Wiener, the founder of cybernetics, who recognized the scientific study of telepathy as a serious matter toward the end of his life. Here are his own words: "With our ever-increasing understanding of memory and its mechanisms, psychology, which was basically a phenomenological science, becomes more and more closely linked to neurophysiology. Many other problems that were previously based on a few scandalous premises, such as the study of direct communication between nervous systems at a distance, have come to be the object of a real field of scientific research, which will not be tainted by the unscientific assumptions encountered in dealing with phenomena having no physical correlates. With some confidence I expect to see these physical correlates discovered (if the phenomena themselves actually exist, which I believe to be quite possible) or conclusively eliminated from consideration."**

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[Footnotes]

108 For example, the noted French astronomer C. Flammarion collected more than a thousand such cases by the questionnaire method.

109 From the book by E. Gurney, F. Mayers, and F. Podmore entitled Prizhiznennyye prizraki [Living Ghosts] (Russian translation, St. Petersburg, 1895), Case No. 79.

110 See Mark Twain, Polnoye sobraniye sochineniy [Complete Works], Vols. 2-3, St. Petersburg, 1911.

111 I.S. Turbenev, Dym [Smoke], Moscow, GIKhL, 1955, page 131.

112 A.N. Skalovskiy, Mikrocosmos i makrokosmos [Microcosm and Macrocosm], St. Petersburg, 1913, page 86.

113 John Bjoerkhem, De hypnotiska hallucinationerna [Hypnotic Hallucinations], Stockholm, 1943, page 103.

114 Ch. Richet, La suggestion mentale et le calcule des probabilites [Mental Suggestion and Probability Calculus], Revue philosophique [Philosophical Review], Vol. XVIII, 1884, page 609.

114 An inch is equivalent to 2.54 centimeters.

117 R. Tischner, Uber Telepathie und Hellsehen [Telepathy and Clairvoyance], Munich, 1920.

118 C. Bruck, Experimentalle Telepathie [Experimental Telepathy], Stuttgart, 1925.

119 Upton Sinclair, Mental Radio, Pasadena Station, USA, 1930.

119 W. Prince, The Sinclair Experiments Demonstrating Telepathy, Boston, 1932.

119 A mile equals 1.60935 kilometers.

120 From a letter written by K.I. Platonov to the author. Quoted with Prof. Platonov's permission.

121 K. Konstantinides, Telepathische Experimente zwischen Athen, Paris, Warschau und Wien [Telepathic Experiments Between Athens, Paris, Warsaw, and Vienna], Transactions of the Fourth International Congress for Physicial Research, S.P.R. London, 1930, page 215.

122 An index of the literature on parapsychology, including telepathy, compiled by G. Zorab (Bibliography of Parapsychology, 1957, N.Y.) contains approximately a thousand titles. See also Proceedings of the Fourth Conference on Parapsychologi-

cal Studies, Parapsychology Foundation, N.Y., 1957.

123 See P.P. Lazarev, Fiziko-khimicheskiye osnovy vysshey nervnoy deyatel'nosti [Physicochemical Bases of Higher Nervous Activity], Moscow, 1922, page 46.

123 The Russian Electrophysiologist V.V. Pravdich-Neminskiy obtained the first electroencephalograms for warm-blooded animals in 1913, using a string galvanometer.

125 F. Cazzamalli, Les ondes electro-magnetique en correlation avec certains phenomenes psycho-sensoriels [Electromagnetic Waves in Correlation with Certain Psychosensory Phenomena] Comptes Rendues de III-e Congres INternational de Recherches Psychiques [Transactions of the 3rd International Congress for Psychical Research], Paris, 1928.

125 See the article by A.A. Petrovskiy entitled: "Telepsikhicheskiye yavleniya i mozgovyye radiatsii [Telepsychic Phenomena and Cerebral Radiations] in the journal Telegrafiya i telefoniya bez provodov [Wireless Telegraphy and Telephony], 1926, No. 34, page 61.

125 See the article by F. Sauerbruch and W. Schumann in the journall Zeitschrift fur technische Physik [Journal of Technical Physics], 1928, No. 3, Leipzig, pages 96 and 315.

126 See V.Ya. Danilevskiy, Issledovaniya nad fiziologicheskim deystviyem elektrichestva na rasstoyanii [Investigations of the Physiological Action of Electricity at a Distance], Vol. 1, Kharkov, 1900; Vol. 2, Kharkov, 1901.

126 See F.P. Petrov, Deystviye elektromagnitnogo polya nizkoy chastoty na vysshuyu nervnuyu deyatel'nost' [Action of a low-frequency electromagnetic field on Higher Nervous Activity], Trudy Instituta fiziologii im. I.P. Pavlova [Transactions of the Institute of Physiology imeni I.P. Pavlov], Vol. I, 1952, page 369.

127 See S.Ya. Turlygin, O vozdeystvii santimetrovykh voln na tsentral'nuyu nervnuyu sistemu [Effect of Centimeter Waves on the Central Nervous System], Doklady Akademii nauk SSSR [Proceedings of the Academy of Sciences USSR], Vol. XVII, 1937, Nos. 1-2, page 19.

127 See O biologicheskom deystvii sverkhvysokochastnogo elektromagnitnogo polya [The Biological Action of a Superhigh-Frequency Electromagnetic Field], Collection, Leningrad, 1957.

127 See V. Arkad'yev, Ob elektromagnitnoy gipoteze peredachi myslennogo vnusheniya [The Electromagnetic Hypothesis for the Transmission of Mental Suggestions], Zhurnal prikladnoy fiziki [Journal of Applied Physics], 1924, Vol. 1, page 215.

127 See S.Ya. Turlygin, Izlucheniye mikrovoln ($\lambda$ = 2 mm) organizmom cheloveka [Radiation of Microwaves ($\lambda$ = 2 mm) by the Human Body], Byulleten' eksperimental'noy biologii i meditsiny

[Bulletin of Experimental Biology and Medicine], 1942, Vol. 14, No. 4, page 63.

128 See B.B. Kazhinskiy, Peredacha mysley [Thought Transference], Moscow, 1923; B.B. Kazhinskiy, Biologicheskaya radiosvyaz' [Biological Radio Communications], Kiev, 1962.

128 See the article by A.V. Leontovich in Yubileynom sbornike AN USSR [Anniversary Collection of the Academy of Sciences UkSSR], Vol. I, Ufa, 1944 (in Ukrainian).

128 See L.L. Vasil'yev's monograph Eksperimental'nyye issledovaniya myslennogo vnusheniya [Experimental Investigations of Mental Suggestion], Izd. LGU, 1962.

129 This is also acknowledged by Prof. V.P. Tugarinov in his article yeshche raz o peredacha mysley [Thought Transference Once Again] in the magazine Znaniye-Sila [Knowledge is Power], 1961, No. 7, page 22.

129 Dynamical Systems in Physics and Biology, by Norbert Wiener, New Scientist, 23 January 1964, page 212.

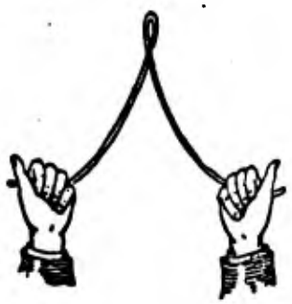
## 7. WHAT CAN BE SAID ABOUT "EXTRASENSORY PERCEPTION"?

Parapsychologists believe that, during the process of evolution, living beings, particularly man, developed organic adaptations for perception and action at a distance that can be compared to the achievements of modern radio engineering and electronics. Thus, telepathy resembles communication by wireless telegraphy or radio, telethesia resembles television, and telekinesis resembles telemechanics – the control of various instruments and processes at a distance with the aid of electronic devices.

There is nothing absurd about this notion. Many examples can be cited to confirm it.

The eye is constructed and functions in roughly the same manner as a camera; the crystalline lens is a unique type of lens, the photosensitive cells of the retina (rods and cones) are like a living photographic film, etc. Dolphins and certain nocturnal animals (bats) have ultrasonic direction-finding organs, while fish living in murky river waters (the Nile longnose gar) have radio direction-finding organs.* In some cases technology has far outstripped that which living beings have achieved during evolution. In other cases man's ingenuity clearly lags behind the resources of living nature; thus, for example, no techniques or chemical analysis of air can pick up the volatile substances that the olfactory apparatus of a hunting dog or many species of wild animals can perceive and recognize.

By a number of special experiments and observations parapsychologists intend to prove that at least some animals and individual human



Metal rod used by dowsers.

beings are capable of perceiving objects and phenomena under conditions that make their perception through the usual sense organs (those of sight, hearing, touch, and smell) completely impossible, e.g., can recognize objects in sealed opaque envelopes ("clairvoyance") or can tell what is happening at a great distance ("prescience"). In engineering the former corresponds to roentgenoscopy and the latter to television.

Let us now become acquainted with some of the phenomena that parapsychologists believe to exist and to prove the reality of "extrasensory perception." Prime among these we must consider the ability to find subterranean water and ores, which was known to the Greeks and Romans.

N.A. Kashkarov, a professor at the Tomsk Technological Institute, characterized this amazing type of bodily reactivity in the following words:

"A person endowed with the ability to find water holds in his hands a simple forked twig from a nut tree and, from the turning of the stick resulting from his convulsive reflex (unconscious) movements, can point out the location of a subterranean stream, determine its width, its approximate depth below the surface, and the direction in which the water is moving, and trace its course. Many dowsers sense the influence not only of subterranean streams, but also of gas flows and electric current when within their fields of action; in addition, they can detect the presence of metal and ore deposits. After prolonged training, some dowsers have succeeded in developing the ability to distinguish the sensations induced by different substances and can determine precisely what is affecting them at a given point."*

The problem of the dowsing rod is still a pressing one, since this method is employed in many nations.* It has a complex history and an extensive literature has been devoted to it; it has often been discussed at international scientific congresses. Thus, for example, a competition was held among users of the dowsing rod at the Second Congress of Experimental Psychology in Paris in 1913. Many of the participants were able to perform all the tasks included in the program of prearranged experiments, which corresponded to the types of search enumerated by N.A. Kashkarov. The Congress recognized the ability of certain persons to locate water and ores by this technique (using a wooden or metal rod) as a proven fact and suggested that further efforts be directed at investigating the physical force that induces the muscular reaction leading to movement of the rod in the dowser. C. Richet designated this force, which is generated by a subterranean source and stored by the air in subterranean caves or by metal-ore deposits, as rhabdic (la force rhabdique). In his opinion, it consists of "as yet unknown vibrations" capable of increasing some hidden sensitivity of the human body (cryptesthesie) unknown to physiologists and psychologists. On this basis Richet;** like Barret;*** assigned such phenomena to the realm of parapsychology, feeling them to be related to "clairvoyance."

Other authors (Chevrel, for example) regarded the movements of the dowsing rod as having something in common with ideomotor actions, which we considered in Chapter 5. In their opinion, experienced dowsers can determine the location of a spring or ore deposit from the character of the soil and vegetation and expressed the idea thus generated with an appropriate movement with the rod.

Finally, physicists who dealt with this phenomenon (e.g., the Frenchman H. Mager) tried to interpret it from the biophysical standpoint and to substitute physical devices for the dowser and his rod.

The first attempt to construct such a device was made in 1903 by Schmidt in Berne. The presence of a subterranean stream was detected from the fluctuations of a weakly magnetized pointer in the instrument.* This means that the mysterious rhabdic force is electrical or magnetic in nature.

More complex instruments and techniques are now employed for probing the bowels of the earth by radio. However, it must be acknowledged that cases have been described in which physical instruments did not yield reliable results, while a dowser solved the problem to perfection. According to Kashkarov's data, the dowser's body is better than any existing physical device, reacting to changes in atmospheric ionization or in the descending atmospheric electric current that can be detected above underground streams or ore deposits, since in these locations the soil always releases more of the radioactive gas radon into the air.

We still do not precisely know the true cause of the motor reaction of a dowser pointing out the location of an ore deposit or a spring, but it appears as though biophysicists will be more and more successful in resolving this question. It is incomprehensible, however, that only a few members of the human race have the capacity to locate water and minerals. Such rarity and exclusiveness is characteristic both of this ability and of all parapsychological phenomena, which greatly hampers their study.

Not long ago we had occasion to be present at a demonstration of the ability to react to the influence of an underground stream by rotating a spring-wire "rod" (similar to that shown in the figure). A young scientific worker, a specialist in geophysics, walked rapidly in the direction pointed out to him, holding the "rod" in a horizontal position. When he approached the place where water was invisibly and inaudibly flowing, the rod dropped to the vertical position and began

to rotate counterclockwise. As the subject moved away from this site the motion of the rod became slower and then stopped. The experiment was repeated a number of times and recorded on motion-picture film.

There is another group of phenomena that, like dowsing, are designated by the term "clairvoyance." In contrast to dowsing, however, they are characterized by extreme (supernormal) acuity of the ordinary sense organs, those of sight or hearing. They are observed in persons who have been hypnotized or entered an autohypnotic trance.*

The annals of medical science record many cases of pathological sharpening of the senses. For example, according to Dr. Brachet, an apparently healthy individual suddenly noted that his vision had become unusually acute: he could clearly distinguish very small objects at very great distances. This state lasted approximately a day and the patient then developed apoplexy and died. An autopsy revealed that a blood clot had recently formed on the right side of the thalamus opticus. As Dr. Mitchell has noted, some of his neurological patients could read in light under which healthy persons had difficulty distinguishing even very large objects.**

The increase in auditory sensitivity observed in certain hypnotic subjects and hysterics may be so great that they can clearly hear even a very soft whisper at a great distance.

Such sharpening of vision or hearing sometimes becomes absolutely incredible. Here is one case of this type described to me in a letter from Dr. B.F. Shilo and A.I. Lapitskiy of the Polotsk Psychiatric Hospital. Their patient was an intelligent middle-aged man suffering from alcoholism. On one occasion,during his hypnotherapy session, the following phenomena were observed by the hospital personnel (Case history No. 186, 1957):

"A newspaper was taken from a large pile of papers and magazines

lying on a bookcase and given to the patient, who was instructed to read its title without opening his eyes. The patient remained silent, with his eyes closed. Then the physician made a passive movement toward the title of the newspaper with the index finger of the patient's right hand, mentally fixing his attention on this point in space with the aid of the kinesthetic sense of his hand (without touching the finger to the text). The patient correctly read the name of the Belorussian newspaper "Zvezda" [Star]. Using the same method, the patient then read the headings of articles, individual sentences, and words in finer print. With his eyes closed he read the title of the newspaper "Pravda" through single and double sheaths of clean rag-free paper. After awakening, the patient remembered that he saw the large type of the headlines "through a mist," while the fine print of the text "ran together in his eyes." The experiment was conducted with the text brightly illuminated. It was more difficult for the patient to read the text when the illumination was reduced or when the thickness of the "paper barrier" (1-2-3 sheets of paper) was increased. There was absolutely no possibility that the patient had been familiar with the newspapers, since he did not have access to the room in which they were kept and had not been told the nature of the experiment."*

The authors of this report recall a similar observation made by one of the prominent Russian psychiatrists, S.S. Korsakov. A patient of his, a young female hysteric, had the ability to use "her sense of touch and her general sensations, especially thermal sensations," to read printed material placed in an envelope with a piece of photographic film,** to read through several layers of paper, and even to determine the type of handwriting and the color of the ink used. Prof. Korsakov wrote that: "Patients sometime astound onlookers by telling them things that could not have been learned through ordinary perception by the

sense organs, a phenomenon that strikes credulous people as being almost supernatural."*

In 1962 similar experiments were conducted with R. Kuleshova at the psychology laboratory of the Nizhniye Tagil Pedagogic Institute. They attracted the attention of a scientific conference being held at the Ural Branch of the All-Union Society of Psychologists. The manner in which these experiments were conducted has been described many times in the press.

"Roza Kuleshova was blindfolded with a kerchief. However, running the fingers of her right hand over the printed text, she easily continued to read a newspaper. She was given a photograph and, without seeing it, Roza again used her fingers to determine the pose and appearance of the person depicted. Pieces of paper of different colors were placed in an opaque envelope and she named the color of each. Roza correctly took spools of thread of certain colors or predetermined playing cards from a closed bag. She even determined the content of the small picture on a postage stamp by touch.

Roza explains this in the following way: when she touches a colored surface she perceives one color as wavy lines, another as dots, and a third as crosses. A visual idea of a given color develops simultaneously with these sensations. Kuleshova's extraordinary tactile sensitivity resulted from persistent practice. At one time she worked in a school for the blind; after suffering an attack of rheumatic encephalitis, her sense of touch became more acute. Roza developed the ability to "see" colors by touch."** As further experiments showed, Roza can use her fingers to read a printed text covered by a sheet of celluloid. She need not touch the object for the experiment to be successful.

These initial data were then materially expanded by serious experiments with optical instruments conducted at scientific research

Institutes in Moscow and Sverdlovsk. It was demonstrated that R. Kuleshova can read printed matter and recognize colors only when the objects in question are sufficiently well illuminated, so that her extraordinary tactile sensitivity is nothing other than a cutaneo-optic sense obeying certain of the rules known to hold for sensations of light and color experienced by the eyes. For example, when Roza touched ablue square in red light she called it violet, the same color seen by the experimenter. This led to the hypothesis that the skin of Kuleshova's fingers might contain photosensitive pigments similar to those in the rods and cones of the retina. However, no compounds of this type were found in her skin.*

Scientists were initially at a loss to explain these startling phenomena. Some believed that Kuleshova reacted to the minute differences in temperature exhibited by surfaces of different colors; this is possible, since experiments conducted in darkness were unsuccessful. Others suggested that Roza felt the structural differences in the dyestuffs with her fingers. A third group was reminded of the experiments of Prof. A.N. Leont'yev, who, more than 20 years previously, had discovered a method of sensitizing the skin of the palm (i.e., increasing its sensitivity) to a beam of light that was prevented from having any thermal effect by special filters. One area of the skin was sensitized by electrical stimulation of another area, which enabled the subject to determine when the action of the light began and ended. A completely blindfolded subject not only sensed the light on his skin but could distinguish red light from green.

The further investigation of cutaneo-optic sensitivity has been facilitated by the fact that this amazing ability has been detected in several other persons, principally children and adolescents, including the blind. However, their sensitivity, which differs in some

respects from that of R. Kuleshova, has not yet been subjected to reliable laboratory verification.

A "rival" to R. Kuleshova turned up in the United States in the person of Patricia Stanley, an elderly woman. Her ability to distinguish colors with her fingers (even through rubber gloves) was investigated by Richard Youtz, a professor of psychology, and other scientists. As the American press reported, these experiments were also successful in darkness, when the object to be distinguished was illuminated with invisible infrared rays.*

An important step forward was taken by A.S. Novomeyskiy, a lecturer at the Nizhniye Tagil Pedagogic Institute. He showed experimentally that the cutaneo-optic sense can be detected and more or less highly developed even in "mere mortals" (although not everyone) by prolonged systematic training. Of 50 male and female students in the school of graphic arts, 10 were trained to recognize first two and then three or more colors with their fingers. Even more striking was the fact that some of them acquired the ability to determine the color of sheets of paper held at a distance of 20-80 cm from their hands. Screening of the colored paper with aluminum foil, thin sheets of iron or copper, opaque paper, glass, transparent films of various materials, or liquids (water, gasoline) did not prevent discrimination and recognition of the colors. A.S. Novomeyskiy referred to this phenomenon as the "penetrating power of cutaneo-optic sensitivity." The subjects had no visual sensations in any of these experiments, recognizing each color from a unique cutaneous sensation (heat, cold, attraction or repulsion of the fingers) specific to the color in question.** It is understandable that the recognition of colors at a distance appears to be more difficult than their identification by touch. This problem is the next one confronting scientists. Only working hypotheses have as yet been proposed and, while

they may aid us in moving forward, they are usually of only temporary value.

It is probable that I.P. Pavlov was referring to such phenomena on one occasion. Having described the extremely fine differentiation of conditioned stimuli in experiments on dogs, he continued: "In human beings, higher conscious activity runs counter to these lower faculties of differentiation and displaces fine differentiation. That this is so is demonstrated by the fact that the differentiational ability is heightened in some individuals when their normal conscious activity is altered. In special states of so-called clairvoyance, the human differentiational capacity becomes infinitely precise."*

This concept of Pavlov's reduces to the fact that the highest activity of the cerebral cortex, conscious activity, can suppress or inhibit more primitive cortical functions; it is extended in an interesting discussion by the biophysicist N.D. Nyuberg: "The maximum sensitivity, which appears only in exceptional cases, is thus the sensitivity of the receptors (the peripheral sense organs – Author) themselves and is always inherent in them. However, there is a more central apparatus that regulates sensitivity and does not permit the individual to make full use of it at will. This apparatus seems to me to be something on the order of the "foolproofing" used in technology, if such a comparison is possible. Only under extraordinary conditions does this protective apparatus pass extremely weak signals, which the body cannot utilize. Some cases of "telepathy" can perhaps be explained in this manner. The increase in the sensitivity of the sense organs observed in nervous diseases, and specifically in Roza Kuleshova (who has a mild form of epilepsy – Author), can be attributed to attenuation of the functioning of this apparatus."**

N.D. Nyuberg acknowledges that suggestion (both verbal and mental)

From Prof. Richet's experiments with the noted percipient Engineer Ossovetsky.

may have played a part in the experiments with Roza Kuleshova. Control experiments were conducted in order to exclude this possibility: Roza was asked to read with her fingers a text from a book opened at random. Parapsychologists resort to a similar procedure in their experiments. For example, in order to exclude the possibility of telepathy they hand the subject a sealed envelope containing an object (a drawing or written sentence) prepared beforehand by someone not present at the experiment.

The parapsychological literature describes many such experiments conducted under these conditions with persons who apparently had the gift of "clairvoyance." The most successful of these were those involving the Polish engineer Stefan Ossovetsky. In 1921 Prof. C. Richet and his colleagues traveled from Paris to Warsaw for the sole purpose of conducting a series of experiments with him. Before the investigation began, one of Richet's coworkers or Parisian friends prepared some sort of written text or line drawing, which was placed in an opaque envelope, sealed, and given to Richet. A number of these envelopes were employed in the experiment. Neither Richet nor anyone else present knew what they contained. The envelopes were given to Ossovetsky one after another. Crumpling each one in his hand, he quickly and almost always accurately named its contents.

For example, the parapsychologist R. Sudre sealed into an envelope a note with Pascal's saying: "Man is no more than a reed, the weakest in nature, but this reed thinks."

Ossovetsky read: "From the thought of Pascal. Man is weak, a weak reed, the most intelligent reed."

In another experiment Ossovetsky was handed a sealed lead tube containing a note. The subject declared: "This is a drawing. A man with a large mustache and heavy eyebrows. No nose. He is in uniform. He resembles Pilsudskiy. This man fears nothing; he is like a knight."

From the tube (whose walls were 3 cm thick) was taken a drawing that corresponded precisely to the description given by Ossovetsky; beneath it was written "a knight without fear or reproach."*

During his stay in Warsaw, Richet conducted 11 such experiments and in all of them obtained more or less the same result as in the two we have described. He regarded these experiments as being very conclusive, writing: "We are convinced that the startling facts reported to us about Ossovetsky were in no way exaggerated." Not knowing all the details of the manner in which the experiments were set up and conducted (Richet discussed them too briefly), we cannot accept so crucial a conclusion without reservations.** It should be added that Ossovetsky carried out these tests while in a state of trance, which he was able to induce by autosuggestion and avoidance of extraneous thoughts.

In 1946 Prof. P.V. Terent'yev (a biologists and statistician), Prof. Ya.I. Perikhan'yants (a therapist), and I conducted a similar series of experiments, whose set-up and results the reader can evaluate for himself.***

A beginning scientific worker (a physiologist) agreed to be the subject. She exhibited no parapsychological faculties. We consequently attempted to intensify these faculties with an extract of the Mexican cactus known as peyote, which has a high content of mescaline, a drug that greatly increases the excitability of the cerebral cortex, particularly its visual region. Two hours after the extract was administered, beautiful and vivid visual images began to develop and succeed another kaleidescopically in the subject's field of vision when her

| № опытов | № предметов | Предметы, находившиеся в коробочках | Ответы испытуемой |
|---|---|---|---|
| 1 | 10 | Почтовая марка в 1 руб. со зданием Центрального телеграфа в Москве | Каменный дом. Как вы ухитрились спрятать сюда дом? |
| 2 | 6 | Три веточки красного коралла | Красное пятно |
| 3 | 4 | Медная копейка 1940 г. | Все, что угодно: колонка, синее ожерелье, ручка. |
| 4 | 5 | Сухой цветок желтой мимозы | Красный блик. Зеленый стол, стол круглый, мягкий. |
| 5 | 7 | Компас (брелок) | Желтое, овальное, твердое, оранжевое, звучит. |
| 6 | 2 | Нефть в пробирочке с корковой пробкой | Ничего нет. |
| 7 | 9 | Свежий лист традесканции | Что-то длинное, змея, кольцо, синее. Холодно. Хватит! |
| 8 | 8 | Мелкая лягушка (заспиртованная) | Вата белая, да, вата, что-то живое. |
| 9 | 3 | Аметист | Платочек (испытуемая поет). |
| 10 | 1 | Коробка пустая — одна вата | Белое покрывало. Ой, надоело, там живут, мягкий человек. |

1) Experiment No.; 2) number of objects; 3) Objects in boxes; 4) subject's responses; 5) 1 ruble postage stamp depicting the Central Telegraph Building in Moscow; 6) a stone house. How did you manage to conceal it?; 7) three branches of red coral; 8) a red spot; 9) a copper kopeck dated 1940; 10) whatever you like: a column, a blue necklace, a handle; 11) a dried yellow mimosa flower; 12) a patch of red light. A green table, a round, upholstered table; 13) a compass (miniature); 14) yellow, oval, hard, orange, makes noise; 15) petroleum in a test-tube with a cork stopper; 16) nothing; 17) a fresh tradescanthia leaf, 18) something long, a snake, a ring, blue. Its cold. Catch it!; 19) a small frog (preserved in alcohol); 20) white cotton, yes, cotton, something alive; 21)amethyst; 22) a handkerchief(the subject was sweating); 23) an empty box with a single piece of cotton; 24) a white shawl. Oh bother, something living, a flabby person.

eyes were closed, inducing an ecstatic, excited state. While the effect of the peyote was at its height, we tested the subject's extrasensory perception.

Various small objects were placed in 10 sealed black plastic boxes (one in each box) and tightly packed with hygroscopic white cotton at the top and bottom. None of the participants in the experiment knew which object was in which box. During the experiment the boxes were kept in an adjoining room. One of them was taken at random and given

to the subject, who was instructed to describe in sequence the images that occurred to him by free association and then to try to guess the object in the box. Everything the subject said was recorded by someone specifically assigned this job. After each experiment (a series consisted of 10 experiments, equal to the number of boxes) one of the experimenters went into the adjoining room, opened the lid of the box, and called out through the door to the record-keeper the number of the object it contained (from a numbered list of the object).

The table shows the complete record of a series of experiments conducted on 19 May 1946, beginning at 5:25 AM and ending at 5:37 AM.

In our opinion, of the 10 experiments the 1st was completely successful and the 5th and 8th can be assumed to have been partially successful, especially since two series of control experiments carried out with the same subject on the day before and the 5th day after administration of the peyote did not yield similar results (the correlations were markedly poorer).

The reader may find that we have overvalued our results and he has reason to do so. The inevitable shortcoming of such experiments lies in the fact that their evaluation is very subjective, yet it is scarcely possible to eliminate this subjectivity.

Contemporary parapsychologists consequently prefer to employ quantitative analysis based on experiments with Zener cards. Data obtained in this manner are readily subjected to statistical processing and objective evaluation.

The application of this technique to telepathy was described in the preceding chapter. It is also used in experiments to detect "extrasensory perception," the only difference being that the experimenter does not look at the card he has drawn, but merely holds it apart from the deck until the subject has recorded his answer and given the sig-

| №№ опытов | Время опытов | Экспериментаторы | Число данных | Правильных | Неправильных | Положит. отклонение |
|---|---|---|---|---|---|---|
| 1 | VII—VIII. 1961 г. | Рызл, Рызлова | 2000 | 1144 | 856 | 144 (7,2%) |
| 2 | V. 1962 г. | Банерджи (Индия) | 1000 | 781 | 219 | 281 (28,1%) |
| 3 | VI. 1962 г. | Пратт (США), Рызл | 800 | 452 | 348 | 52 (6,5%) |
| 4 | I—II. 1963 г. | Пратт, Рызл | 2000 | 1133 | 867 | 133 (6,7%) |
| 5 | IV. 1963 г. | Рызл, Барендрегт, Баркема, Капперс (Голландия) | 2048 | 1215 | 833 | 192 (9,4%) |

1) Experiment No.; 2) time of experiment; 3) experimenter; 4) number of trials; 5) correct; 6) incorrect; 7) positive deviation; 8) Ryzl; 9) Ryzlova; 10) Banerdgi (India); 11) Pratt (USA); 12) Barendrecht; 13) Barkheim; 14) Kappers (Holland).

nal for the next trial. According to the data of Dr. Rhine and his followers, large series of such experiments conducted with parapsychologically gifted subjects sometimes yield the same above-chance results as the telepathy experiments carried out with the same Zener cards.

The experiments of Mislan Ryzl, the Czech parapsychologist and biochemist, have recently received wide publicity and recognition abroad. Dr. Ryzl used hypnotic suggestion to develop or improve his subjects' parapsychological faculties, especially the ability to identify the color of cards sealed in opaque envelopes. It was suggested to subjects in trance that they wished to participate in the experiments, that they were confident of success, that their minds would be trained to avoid thought that would interfere with the experiments, that they would acquire the ability to experience hallucinatory images corresponding to the object of the experiments, etc. Dr. Ryzl believes that these suggestions enabled him to obtain consistent, repeatable results in his investigations.

Subject P.Sh. was especially noteworthy in this respect. M. Ryzl conducted a number of experiments with this subject at which parapsy-

chologists from other nations were present. In all series the number of correct responses substantially exceeded the number of incorrect responses. The difference obtained was found to be statistically reliable (see Table).

The experimental set-up was very simple. In an adjacent room the experimenter's assistant took 10 two-color cards (one side was black or, in some experiments, green, while the other side was always white) and placed them in identical thick-paper envelopes. The white side of the card faced upward in some of the envelopes and the black (or green) side faced upward in others. The assistant handed the packet of ten envelopes with cards to the experimenter, who sat at a table behind a screen and shuffled them. During the experiment neither the subject, the assistant, nor the experimenter himself saw the content of the envelope. The experimental procedure consisted in the experimenter's placing envelope after another in front of him on the table; the subject had name the color of the upper side of each card, the experimenter and the assistant separately recording his answers. The assistant then prepared the next packet of 10 envelopes, and so forth. The experiments were repeated from day to day and a large amount of experimental data was thus amassed. The table shows the composite data and is taken from an article by Pratt and Ryzl.*

One feature of these experiments was the fact that in order to produce a positive result it was not necessary for the subject to touch or even bring his hand close to the object to be guessed, which was some distance from him. In this respect the experiments in question differed materially from those used to investigate cutaneo-optic sensitivity. They were also distinguished by the fact that the ratio of correct to incorrect responses was substantially lower than in cutaneo-optic experiments. However, some of Dr. Ryzl's experiments are

basically related to those designed to test cutaneo-optic sensitivity. For example, in Ryzl's experiment the subjects correctly determined the position of the hands on a watch face by feeling the closed lid of the watch with their fingers. The experimenter set the hands in such fashion that he himself did not know their position.

We will not dwell here on cases assumed by parapsychologists to be "prescience," since two such cases reported by Prof. Richet were described at the end of Chapter 2.

We can now give a brief answer to the question posed in the title of this chapter. The concept of "extrasensory perception" includes phenomena of diverse types. Some of them have the character of motor reactions to "imperceptible" (subsensory) influences exerted by radiations or radon emanating from the first or by locally intensified ionization of the air. Certain persons are especially sensitive to these geophysical factors, while for most people they remain below the threshold of sensitivity. There is obviously nothing parapsychological in this, nor is there in the group of phenomena characterized by an abnormal temporary increase in the sensitivity of the ordinary visual, auditory, or cutaneous analyzers, etc. Finally, a third group of phenomena, recognized only by parapsychologists, consists in the perception of objects or events by as yet unknown sense organs (Prof. Richet's cryptesthesia) or directly by certain cortical neurons, bypassing the ordinary sense organs; the latter is extremely difficult to imagine.

Parapsychologists can cite fewer data to support the existence of this last category of phenomena than to demonstrate that of "mental radio." Nevertheless, we cannot simply brush aside the experiments of Richet, Rhine, and many others. Further patient research is necessary. We say: ignoramus sed non ignorabimus (we do not know, but we will learn)!* It is not superfluous to add that one of the most prominent

of all biologists, I.I. Mechnikov, acknowledged the existence of "clairvoyance" and thought it to be an atavistic human trait passed down from the animals. He wrote: "Certain well-established 'clairvoyant' phenomena can perhaps be reduced to the excitation of special senses that are atrophied in man but present in animals."*

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[Footnotes]

133 These problems are now being dealt with by a new science called bioelectronics or bionics.

134 N.A. Kashkarov, Obnaruzheniye podzemnykh vod po izmeneniyam vyzyvayemym imi v atmosfere [Detection of Subterranean Waters from the Changes They Produce in the Atmosphere], Kiev, 1916, pages 5-6.

135 In 1961, I received a letter from Czechoslovakia, from the dowser Stanislav Dokulil, in which he wrote, disagreeing with a German professor who had published a book on this subject (O. Prokop, Wuenschelruthe, Erdstrahlen und Wissenschaft [O. Prokop, Wuenschelruthe, Earth Rays and Science], Berlin, 1957), that the dowsing rod has successfully been used by agricultural collectives for 32 years.

135 Ch. Richet, Traite de Metaphysique [Treatise on Metaphysics], 2nd Edition, Paris, 1923, page 297.

135 See V. Barret, Zagadochnyye yavleniya chelovecheskoy psikhiki [Mysterious Phenomena of the Human Psyche], Moscow, 1914.

135 Henri Mager, Kak nakhodit' istochniki i rudu s pomoshch'yu orekhovoy ili metallicheskoy palochki i raznykh nauchnykh oriborov [How to Find Springs and Ore with the Aid of a Nut-Tree Wood or Metal Rod and Various Scientific Instruments], Kiev, 1913.

136 For a description see the aforementioned work by N.A. Kashkarov, Obnaruzheniye podzemnykh vod po izmeneniyam vyzyvayemym imi v atmosfere [Detection of Subterranean Waters From the Changes They Produce in the Atmosphere].

137 The word trance is derived from the Latin transire, to pass, and means transition from the normal state into "an unusual state of passivity, conscious or unconscious, physiological or pathological, during which mental life passes out from under the control of the will" (Byrd).

137 See Dr. Byrd's article in the book: D.I. Mendeleyev, Mater-

ialy dlya suzhdeniya spiritizme [Materials for an Evaluation of Spiritualism], page 287.

138 Quoted with the permission of the authors.

138 A piece of photographic film was used as a control, in case the patient attempted to look into the sealed envelope (the film was developed after the experiment).

139 S.S. Korsakov, Kurs psikhtriatrii [Course in Psychiatry], Vol. 1, 3rd Edition, Moscow, 1913, pages 95-96.

140 See N.D. Nyuberg, "Zreniye" v pal'tsakh ["Vision" in the Fingers], Priroda [Nature], 1963, No. 5, page 65.

141 From reports in the New York Times, 8 January 1964.

141 See A.S. Novomeyskiy, O prirode kozhno-opticheskogo chuvstva u cheloveka [The Nature of the Cutaneo-Optic Sense in Man], Voprosy psikhologii [Problems of Psychology], 1963, No. 5.

It has been established that the ability to react to light and color without the aid of the eyes is also inherent in certain animals, specifically some species of fish. Blind fish can perceive light through the transparent bones of the skull, making direct use of that portion of the diencephalon from which the retina is formed during embryonic development. The skin also has color sensitivity, at least in some species of fish. Yu.A. Kholodov was able to develop in blind carp a conditioned defensive reflex to illumination with red or green light when the colored signal was reinforced with an electric current, which served as the unconditioned stimulus in these experiments (see Yu.A. Kholodov, Vyrabotka uslovnykh refleksov na svet u osleplennykh ryb [Development of Conditioned Reflexes to Light in Blind Fish], Nauchnyye doklady vysshey shkoly. Biologicheskiye nauki [Scientific Papers Presented at the University Level. Biological Sciences], No. 2, 1958, page 74). We do not know what type of sensations are induced in fish by cutaneous photoreception, whether they are visual or of some other sort (like those of humans with cutaneo-optic sensitivity). We do know, however, that this type of sensitivity is not a unique capacity of certain members of the human race.

142 I.P. Pavlov, Lektsii po fiziologii [Lectures on Physiology], Polnoye sobraniye sochineniy [Complete Works], Vol. V, 1952, page 520.

142 N.K. Nyuberg, "Zreniye" v pal'tsakh ["Vision" in the fingers], Priroda [Nature], 1963, No. 5, page 66.

144 These examples are taken from Ch. Richet's Traite de Metapsychique [Treatise on Metapsychology], Paris, 1923, pages 251-253.

144 It must be said, however, that Ossovetsky demonstrated his experiments (always successfully) for a number of years before many scientists with different specialties and none of

them were able to catch him in any deception.

144 L.L. Vasil'yev, Ye.T. Gal'vas, Ya.I. Perikhan'yents, and P.V. Terent'yev, K voprosu psikhofiziologicheskom deystvii "peyotlya" [The Psychophysiological Action of Peyote], Trudy instituta mozga im. V.M. Bekhtereva [Transactions of the Institute of the Brain imeni V.M. Bekhterev], Vol. XVIII, 1941-1946, page 55.

145 Tradescanthia is a herbaceous house plant with long, drooping, intertwined stems and oval leaves.

148 M. Ryzl and J.G. Pratt, A further confirmation of stabilized ESP performance in a selected subject, Journal of Parapsychology, Vol. 27, No. 2, June 1963, page 73.

149 A paraphrase of the well-known Latin saying of Dubois Raymond: "We do not know and we do not learn."

150 I.I. Mechnikov, Etyudy optimizma [Studies in Optimism], Moscow, 1917, page 188.

## 8. CAN MUSCULAR FORCE BE TRANSMITTED AT A DISTANCE?

The achievement of telemechanics, the creation of electronic equipment that permits various machines and processes to be controlled at a distance, involuntarily brings to mind the question of whether living organisms, under certain conditions, have some sort of ability to both perceive and act on objects at a distance by means of electromagnetic energy or perhaps some other, as yet unknown form of energy that they produce. We mentioned in Chapter 5 the remarkable electronic device by means of which the electric currents of human muscles can be used to activate the fingers of a "mechanical hand" even when the individual only thinks of some action. We also noted (in Chapter 6) that the low-frequency (of the order of 40-50 Hz) electromagnetic field generated by the currents of contracted muscles can be picked up by a radio receiver tuned to this frequency.*

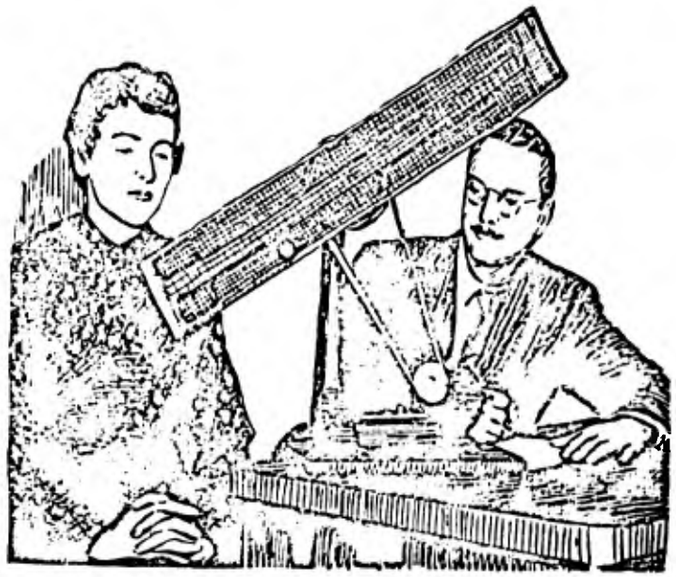
In the near future we can expect that artificially amplified radio waves originating in the muscles, heart, and brain will be utilized at a distance to fulfill certain practical needs. But are there receivers for these waves in nature itself, in the world of living beings? There apparently are. Here are some examples to support this.

In 1928 there appeared the results of an original investigation conducted by Rudolph Reutler, the head of the malaria laboratory in Rosh Pinach (Palestine), under the title "Action of Living Organisms on Isolated Living Organs at a Distance."** This research was conducted with the peristaltically contractible internal organs of insects, particular the alimentary canal, excretory system (Malpighian vessels),

and female gonads (ovaries) of the Asiatic locust. When dissected out and placed in a watch glass containing physiological solution, these organs continue to contract ryhthmically for ten hours. Reutler noted that their contractions were greatly intensified whenever he, while examining them through a binocular magnifier, sharply contracted the muscles of his arms or legs or even his respiratory muscles (in taking a deep breath). The intensified peristalsis in the organs under investigation disappeared after the observer stopped contracting his muscles. Reutler detected this remarkable phenomenon 80 times in experiments on many preparations. His tests were made at a very high room temperature (about 30°), which excluded the possibility that the air exhaled by the observer had a thermal effect on the preparation. Reutler also observed this phenomenon when insect muscles (e.g., the maxillary muscles of a predatory spider devouring its prey) rather than human muscles contracted near the preparation.

The functioning muscles of one living being can thus intensify the contractions of the muscles of another organism at a distance. Reutler's experiments thus provide a positive answer to the question posed above, but they required confirmation. This was obtained by the young entomologist V.S. Steblin in the laboratory of the Leningrad Institute of the Brain.* Following Reutler's methodological instructions precisely, Steblin attempted to repeat his experiments with croton bugs, which are readily available during the winter, and then with may beetles. In 10 experiments on croton bugs an intensification of intestinal peristalsis was clearly observed in only 3 cases, when this process was quite pronounced without the action of the experimenter's muscles. V.S.Steblin attributed the absence of intensified peristalsis in 7 of 10 experiments to the far from optimum conditions (the comparatively low temperature in the laboratory and the lower intravitam mus-

cle tonus of the insects employed). Actually, in the experiments on may beetles, which were conducted at an air temperature of 20-25°C, Reutler's phenomenon was observed rather regularly. The following is an extract from Steblin's laboratory records.



The subject (left) attempts to influence the fall of the die "telekinetically" (from a photograph by Dr. Rhine's laboratory).

"Intestinal contractions occurred at intervals of 5-6 sec. When 2-3 sec had elapsed after appearance of the peristaltic wave and the intestine was in the resting state, the experimenter inhaled deeply At the instant of inhalation there was an extra wave of contraction in the upper segment of the intestine, which then propagated to the central and posterior segments. After 3-4 sec the experimenter forcibly exhaled, a process usually accompanied by vigorous intestinal contractions. The effect described above was always observed when the experimenter contracted the muscles of his arms or legs." The Malpighian vessels reacted in the same manner, contracting at a higher rate than the intestine (once every 2-3 sec).

I do not know whether R. Reutler's experiments have been repeated by any foreign scientist.* I can only cite the curious assertion made

by the Englishman N. Richmond, who claimed that he could use mental force to control the random movements of paramecia in a certain segment of a microscopic field of view.* This has something in common with Dr. Rhine's incredible assertion that mental force can to some extent control the fall of a die (a bone cube with numerals or spots inscribed on its faces), forcing it to drop with a given face up. Rhine and his followers regard such phenomena as an elementary manifestation of telekinesis (also known as psychokinesis), the ability to exert "a direct mechanical action on matter through mental force and the will" apparently inherent in certain persons. It is self-evident that one cannot speak here of the mind or the will itself, but only of the energy that is perhaps radiated by the brain.

The figure depicts the "dice-throwing machine" used in Rhine's laboratory. It consists of a screen cylinder that rotates around a central shaft and is driven by an electric motor. The experimenter is on the right and the subject on the left; the latter attempts to influence the die ejected from the device. Under such experimental conditions, without outside intervention, the fall of the die should be controlled purely by chance, i.e., over a sufficiently large number of trials each of the six faces of the die should turn up an equal number of times (there is one change in 6 that a given face will turn up). However, as Rhine claims, if a subject with telekinetic ability thinks concentratedly about one face, such as that designated by the numeral 5, and fervently wills it to turn up every time, his efforts apparently are not in vain. The experiment yields an above-chance result, i.e., when a sufficiently large number of trials is conducted the face bearing the number 5 turns up a greater number of times than is predicted by probability theory. In other series of experiments the selected number for each trial is varied by lot, e.g., in accordance with the

number of the page to which the experimenter has opened a book at random.

Parapsychologists have expended a great deal of time and effort in designing such experiments, but only some of them have been able to produce results with a positive deviation from those calculated by probability theory. Thus, for example, in R.H. Thouless's experiments the selected die face turned up 2809 times in 16,232 trials, a positive deviation of 104.* Such a deviation will be produced by shear accident in 1 of 33 cases. The results obtained by Thouless are therefore not very conclusive. The experiments of certain other investigators produced a null result;** i.e., one that did not deviate from the value predicted by probability theory.

In such cases materialistically minded parapsychologists (and some do exist) are dismayed both by the inconclusiveness of the experimental results and by the spiritualistic concept of telekinesis as a clear manifestation of "the influence of the spirit on matter" held by Rhine and his followers. No better, however, is the other view of this question, which assumes the existence of some physically effective material substance ("fluid," "ectoplasm") that is given off by an individual endowed with the ability to bring about telekinetic phenomena. Anyone who has attentively read Chapter 5 of this book will quite probably recognize a revival of mediumism, the most vulgar form of spiritualism, in what has just been described. However, one important difference lies in the fact that spiritualists ascribe the ability to produce telekinetic phenomena to "spirits," i.e., the souls of the dead, while some contemporary parapsychologists assign it to the miraculous characteristics of the "spirit" or, at best, to the psychophysiological organization of the medium himself.

The belief in the existence of persons gifted with telekinetic

power is supported both by the laboratory investigations of parapsychologists who have not given up hope of somehow irrefutably establishing the existence of this force and by constant reports of everyday instances of its manifestation.

For example, two such cases are described in an autobiographical story by the respected Soviet writer K.G. Paustovskiy.

Recalling how difficult it was to obtain water and how highly it was therefore valued in Odessa during the civil war, the writer describes an extraordinary adventure:

"We carried water and poured it into a large glass bottle in the corridor. On one occasion Yasha Lifshits went out into the corridor and began to shout wildly. I rushed out of my room and saw an inexplicable sight. Before Yasha's eyes and mine the enormous bottle slowly began to tip, stood like the Tower of Pisa for a few moments, and then crashed to the floor and shattered into a thousand pieces. The precious water poured down the staircase. We naturally would have had time to catch the bottle, but instead we stood and watched it as though bewitched."

K.G. Paustovskiy regards his second case as "still more astonishing." At one time he was ill with Spanish flu and needed a thermometer, which was then a great rarity. He obtained one with difficulty from Academician Ovsyanniko-Kulikovskiy. The patient took his temperature, placed the thermometer on his bedside table, and went to sleep. Then something incredible happened:

"Yasha awakened me. He carefully opened the door, but it squeaked and I awoke. I glanced at the table and felt my hair stand on end – the thermometer suddenly began to roll slowly toward the edge. I wanter to cry out, but my breath would not come. I saw terror in Yasha's eyes. He also stared at the thermometer and remained motionless. It slowly

rolled to the edge of the table, fell to the floor, and broke. My temperature dropped, probably as a result of my fright. I immediately recovered."*

What does a spiritualist who believes in "spirits" say about these curious cases** from the everyday experience of Paustovskiy? He says that one of the witnesses to the phenomena described, in all probability Yasha, was an unrecognized medium, an involuntary guide for "spirits" in the material world. Some pranksterish "spirit" used Yasha's mediumistic faculties to play a trick on him and his friend.

On the other hand, a contemporary parapsychologist convinced of the existence of telekinesis says that one of the two was a good medium, but in a different sense: his body had the rare ability to emit some sort of energy or matter ("fluid," "ectoplasm") that exerted a mechanical action at a distance from him.

Finally, a skeptic or even just a sensible person would say: before making such speculative conjectures let us consider whether Yasha himself could not have contrived everything in order to play a trick on his friend. Everyone knows somebody with a bent for trickery, buffoonery, and mystification!

The great French mathematician Laplace quite justly said: "We are so far from knowing all the forces of nature and the different ways in which they act that it is not fitting for a philosopher to deny the existence of phenomena merely because they are inexplicable in the present state of our knowledge. We must investigate phenomena with greater care as it becomes more difficult to acknowledge their existence."***

Laplace's words of truth should be taken as a guide by workers in both the so-called exact sciences and the sciences that deal with the plant and animal kingdoms, as well as by scientists who study man,

his personality and behavior, and normal and pathological psychic phenomena. Unfortunately, they have not been adequately applied to the study of man, particularly his psyche.

Nature hides its secrets deeply, but the researcher is not deceived. The individual can, however, be duped. Physicians, criminologists, psychologists, and especially parapsychologists must always be on guard: the patients, clients, and subjects with whom they are constantly coming into contact and who are often hysterical, mentally defective, or even perverted can intentionally or unintentionally mislead them.

Renowned telepathic percipients, "clairvoyants," and mediums frequently fall into precisely this category. The history of parapsychological research convincingly demonstrates that the most eminent scientists have been cruelly deceived by the clever swindles of their subjects. Mathematicians, physicists, and chemists are accustomed to working with instruments and not with human subjects and thus are more frequently the victims of fraud than physicians and physiologists.

Mendeleyev was an unprejudiced investigator of parapsychological phenomena, but he also took full account of the dangers that lie in wait for the scientist in his dealings with mediums and sensitives.* There have also been researchers of this caliber abroad, including Podmor, Lemann, Byrd, and others. In 1875 Byrd formulated a number of precautions that every parapsychologist should keep in mind. Let us have his own words.

"Aside from the general subjective and objective precautions necessary in any experimental investigation, in studying the problem in which we are interested (hypnotism, which seemed to be a mysterious phenomenon at the time – Author) one must take additional measures to eliminate the following special sources of error: 1) deliberate fraud

on the part of the subject; 2)unintentional fraud on the part of the subject; 3) deliberate lack of cooperation by the participants in the experiment; 4) unintentional lack of cooperation by the onlookers; 5) fortuitous coincidences and guesses; 6) phenomena produced by involuntary movements and nervous diseases.

Experiments with professional mediums and clairvoyants in which these sources of error are not taken into account and eliminated are not of the slightest scientific value and are inadmissible as proof. Moreover, if the aforementioned sources of error have been eliminated but the experiments yield seemingly improbable results, they cannot be accepted until they have been repeatedly confirmed by different experimenters."*

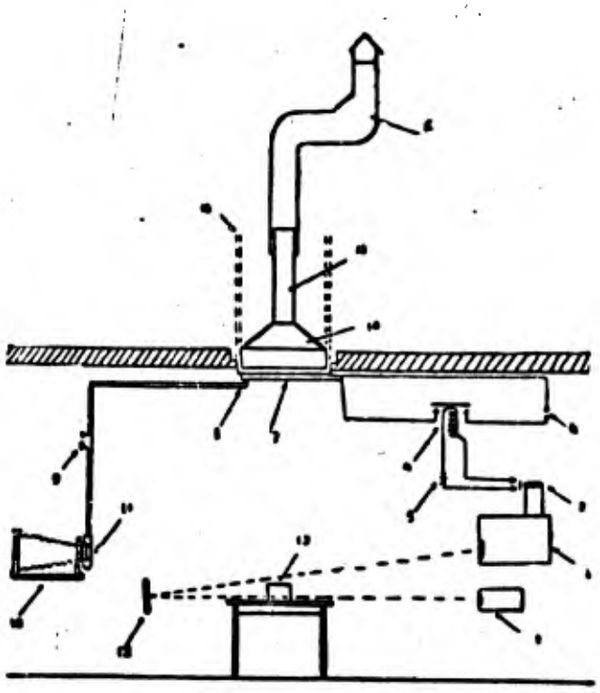
Parapsychologists still take these precautions. They are naturally sensible, but they sometimes exceed reasonable limits and become an obstacle to the further development of parapsychological research. For example, the English philosopher George Price tends to regard all parapsychological phenomena as supernatural. He quite recently declared that he would be satisfied with only one parapsychological experiment in which "error or fraud would be as impossible an explanation as the supernatural."

One may ask how this requirement is to be satisfied. Price is dissatisfied with the statistical results of Dr. Rhine and his school, in which the telepathic or telekinetic element provides only a slight increase over the levels predicted by probability theory. He wishes to see not "microparapsychological" phenomena but just one indisputable, stunning "macroparapsychological" phenomenon. In our opinion, the experiments on telekinesis conducted in 1930-31 at the Paris Metapsychological Institute by its director Dr. Eugene Osty and his son Marcel Osty, an engineer, come close to fulfilling this requirement.

In Thouless's experiments, which were described above, the falling die was apparently guided by a telekinetic force that did not require darkness for its appearance. Osty's experiments, following the example of ordinary spiritualistic seances, were conducted in darkness. There was also a medium, the 23-year-old Austrian Rudy Schneider, who had one theme for his telekinetic abilities. The only unusual factor was the room in which the experiments took place, a laboratory crammed with instruments of whose purpose Rudy had not the slightest idea. The figure contains a diagram of these instruments, their locations, and their functions.

In the center of the room was a small table, on which lay the object to be acted upon (13), usually a white handkerchief. The medium was instructed to use his remote-action "telekinetic force" to move it from its place on the table. He sat on a chair at a distance of several meters from the table, with his back to it; during the entire session his hands and feet were held by controllers selected in turn from among the 6-8 participants in the experiment (workers at the institute headed by E. Osty). In order to follow the movements of the medium in the dark, bandages impregnated with a phosphorescent substance were fastened around his neck, arms, and legs. However, the medium and the object on which he was to act were monitored principally by instruments set up in a rather cunning manner. The ceiling over the table had an opening in which was installed a lamp with quartz bulbs (14) that emitted invisible ultraviolet light. Below the lamp was firmly fixed a screen (7) opaque to ultraviolet rays, which was held in place by an electromagnet supplied with current from a storage battery (5). This same battery also powered another electromagnet (11) that closed the shutter of a camera (10) with a quartz lens. This camera system recorded another set of invisible rays, those in the

infrared region. An infrared source (1) emitted a beam of rays toward the object to be acted upon (13); they passed around the latter, struck a mirror (12), were reflected from it back over the object, and entered a photocell and amplifier (2), which converted them into an electric current that served to close a relay (3).

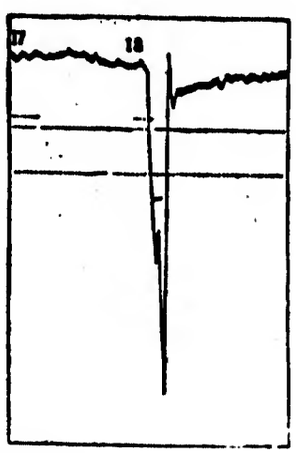


Set-up for experiments on telekinesis at the Paris Metapsychological Laboratory.

Let us now assume that Rudy, having deluded the vigilance of the controllers holding him, reaches out toward the object (handkerchief) in order to move it. In this case he must inevitably interrupt one of the beams of infrared rays, although only for an instant, with his hand (or with whatever object he uses to move the handkerchief). This causes the circuit carrying current to the two electromagnets to be broken; they are demagnetized, releasing the screen over the lamp and the shutter of the camera. The room is flooded with ultraviolet rays, in whose invisible "light" the photographic film records the medium's action without his knowledge.

This was what might have been expected, but something entirely different actually happened: during the seance the camera was activated and took a picture that showed the medium in an innocent pose but with the handkerchief shifted toward the edge of the table or knocked to the floor. How could this have occurred?

The Ostys, father and son, give a truly astounding answer to this question in a monograph containing 116 pages and 61 figures.* Rudy goes into a deep trance. His face becomes contorted and his respiration rate rises from its normal 12-16 breaths per minute to 200-300 breaths per minute. He sometimes says a few words, from which one gathers that a stream of some invisible substance (la substance invisible) is apparently released from his body, that he can see and control it, and that he directs it at the table, where it moves the handkerchief.



Electrogram recorded by Dr. Osty in experiments with the noted subject Rudy Schneider.

The investigators then had an idea for verifying Rudy's assertions experimentally. They employed a galvanometer that recorded its readings on a moving strip of photographic film. The galvanometer was connected to a device (2) that converted the infrared rays to an elec-

tric current and recorded an electrogram. The figure shows one of the 70 such graphs obtained. A current passed through the galvanometer continually and is represented by the upper curve; below it are the traces of the electromagnetic markers. When the beam of infrared rays aimed at the object was interrupted by the invisible substance reaching out toward the latter, the curves took a sharp drop in the form of a double peak.

This means that the invisible substance partially absorbs infrared rays. It was thus possible to use objective electrographic data to follow the "behavior" of the invisible substance; these data agreed with the medium's statements about its movement in space and its action on the object.

This is not all, however. No less stunning details followed later. All this taken together strikes one as a discovery of the greatest importance for physiology, psychology, and physics, since this is an invisible substance that performs mechanical work!

One might have expected the publication of the result of this investigation to have been followed by a world-wide sensation, but nothing of the sort happened. The authors themselves did not continue their work and no one else checked, confirmed, or refuted their results.

More than 20 years later the French parapsychologist Robert Amadou, in his survey of parapsychology*, mentioned Osty's name 23 times in connection with various of his experiments and statements, but said not a single word about his monograph, as though it had never existed. What does this silence mean? The suspicion immediately creeps in that these ingenious experimenters were taken in by a still more ingenious medium.

A strict scientific attitude towards the "facts" regarding the transmission of muscular force at a distance thus enables us to con-

clude that we are dealing with phenomena of a dual nature. On the one hand, they indicate that the muscular activity of one being may depend on another, providing a basis for assuming that muscular force can be transmitted from one to the other over a distance. The experiments of Reutler and Steblin testify to this. On the other hand,there are data that apparently confirm the possibility of telekinetic action on non-living objects. As for experiments conducted by parapsychologists in order to demonstrate this, they either are not outside the limits for purely random coincidents according to the theory of probability or they do not exclude the possibility of error on the part of the observer or fraud on the part of the subject, be it voluntary or involuntary, resulting from mental deficiency or paranormality. We must be especially careful about this type of "experiment," since the extraordinary, supernatural character of their result serves as fertile soil for the most absurd superstitions. This is particularly true in view of the fact that a number of parapsychologists support such superstitions by their scientific authority and the outward show of a strict empirical investigation of the phenomena in question.

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[Footnotes]

153 To this we can now add that the American physicists Volkers and Candibe recently (in 1960) were able to pick up high-frequency (up to 150 thousand hz) biocurrents produced by contracted human muscles. These currents were very weak, but they must nevertheless generate radio signals of equally high frequency around functioning muscles.

153 Revue Metapsychique [Metapsychological Review], 1928, No. 3, page 197.

154 V.S. Steblin died in 1942, during the blockade of Leningrad, leaving his work unfinished. We are quoting from his preliminary report, which I have in my archives. Other workers at the laboratory were often present at Steblin's experiments.

155 Reutler's phenomenon could be conclusively established and of very great significance if it could be recorded electrographically, by feeding the biocurrents from the contracting intestine to an oscillograph equipped with an amplifier.

156 Journal of the Society for Psychical Research, XXXV, 1952, page 577.

157 The probability that each of the six faces will turn up is 2705 in 16,232 trials.

157 These data are taken from Robert Amadou's book La Parapsychologie [Parapsychology], pages 274-283. Amadou himself, like many other noted parapsychologists, regards the results of these experiments with skepticism. The existence of telekinesis is recognized by fewer contemporary parapsychologists than that of telesthesia or telepathy, particularly the latter.

159 K.G. Paustovskiy, Povest' ozhizni [A Story from Life], Sobraniye sochineniy [Collected Works], Vol. 3, Moscow, 1958, pages 773-776.

159 The author himself tells them in a somewhat humorous tone.

159 Laplace, Essai philosophique sur les probabilite [A Philosophical Essay on Probability].

160 See also the account of D.I. Mendeleyev's struggle against spiritualism in Chapter 5 of this book.

161 Byrd, Sushchnost' i yavleniya transa [Essence and Manifestations of Trance], in D.I. Mendeleyev's collection Materialy dlya suzhdeniya o spiritizme [Materials for an Evaluation of Spiritualism], page 296.

161 G. Price, Science and the Supernatural, Science, 1955, No. 3165, Vol. 122, page 359.

164 E. Osty and M. Osty, Les Pouvoirs Inconnus de l'Esprit sur la Matiere [The Unknown Effects of the Spirit on Matter], Revue Metapsychique [Metapsychological Review], 1931, No. 6 and 1932, Nos. 1 and 2.

165 Robert Amadou, La Parapsychologie (Essai historique et critique) [Parapsychology (A Historical and Critical Essay)], Paris, 1954.

## 9. DEATH AND SUPERSTITIONS ASSOCIATED WITH IT

As was noted in Chapter 1, the belief in the existence of the soul beyond the grave has been and continues to be the chief source of anti-scientific ideas and prejudices in a great many persons. The time of the complete supremacy of blind faith, however, has long past. More and more people throughout the world prefer to know rather than to believe. The church has also been forced to reckon with this. It attempts to seize control of popular education and seeks various means by which to "render harmless" the atheistic content of the achievements of modern science and technology insofar as is possible. For example, the Catholic universities organized by the Church of Rome serve this purpose. Particular encouragement is given to efforts to "demonstrate" scientifically (even experimentally) the existence of the soul as some super material, supernatural phenomenon, to prove its independence of all the laws of the objective world, and to show the possibility that the human soul can exist after death, i.e., the possibility of "personal immortality." Many such pseudoscientific attempts have been made, but we will limit ourselves to citing only a few.

At the end of the nineteenth century two French hypnologists, first A. de Rochas (1895) and then P. Joire (1897), informed the scientific world that they had made a truly stunning "discovery," the detachment (externalization) of cutaneous sensitivity. It had long been known that the skin loses its pain sensitivity under deep hypnosis. In the opinion of Rochas and Joire, this was apparently due to displacement of the pain sensitivity of a hypnotic subject from the skin

into the surrounding air, forming a sensitive layer at a distance of several centimeters from the surface of the body. The subject cries out if this layer is pricked with a pin, but does not react at all if a pin is slowly and carefully passed through this layer and plunged into the skin. When the hypnotic trance becomes deeper, the sensitive layer is supposed to move farther away from the body and form a "fluid double" of it, a ghost or phantom. This double can be seen by other hypnotic subjects whose visual sensitivity has been increased by verbal suggestion. The experimenter himself can determine the location of the double only with the aid of some sharp object, such as a needle. The subject cries out and reaches for that part of his body where his double has been pricked with the needle. In another book Rochas (1896) speaks of the possibility that both sensitivity and muscular force can be detached from the body of a hypnotic subject, using this to explain the movement of objects without contact supposedly observed in mediumistic seances.

It is difficult to say whether we should ascribe all this phantasmagoria to the fervid imagination of the experimenters, who tended toward occultism, or to their unintentional suggestive influence on their subjects. Anyone who has dealt with hypnotic subjects of the somnambulistic type knows the surprising ease with which they realize everything that the hypnotist secretly expects of them. His every gesture, the tone of his voice, every carelessly dropped word is perceived by the somnambulist as an indirect suggestion that produces an appropriate effect (in this case an illusion of detachment of sensation, which is of psychic origin, from the body). An error made in conducting a hypnotic experiment is taken as the truth and presented as experimental proof of that which requires demonstration, the seeming possibility that the soul, or psyche, can exist outside the physical body.

Of similar origin was another apparent discovery made by Rochas, his assertion that the memory of a prior incarnation of the soul can be revived and brought out under very deep hypnosis: the subject suddenly begins to speak in another voice, on behalf of someone else, who describes his long-ago life. This is presented as experimental proof of the doctrine of reincarnation of the soul.

The greatest impression on those who hope for eternal life, however, was made by the many years of "experimentation" conducted by prominent scientists headed by the famous psychologist William James, the founder of philosophical pragmatism and a member of the London and American Societies for Psychical Research. These "experiments" were intended to demonstrate conclusively that it is possible to communicate with the spirits of the dead through the intermediary of mediums supposedly capable of receiving reports from the "next world" and passing them on for general information by automatic writing.

The spirits of dead members of the aforementioned societies, "revealed" in this manner, were to make every effort to prove their "personal existence" by recalling unimportant events from their earthly lives.

Here, for example, is a specimen of such a tragicomic conversation between William James and his dead colleague Hodgson: "Do you remember, William, how we played games with the children in the village of such-and-such? Do you remember that I said such-and-such to you while we were in a room where there was this-and-that furniture?" – "I do remember, Hodgson." – "That's good proof, isn't it, William?"– "Excellent, Hodgson." and so on, ad infinitum.

Even so incurable a mystic as Maurice Maeterlinck* was shocked by such conversations with the dead and preferred to attribute all this to the telepathic effect of James's conscious or unconscious

psyche on the medium doing the automatic writing.

We have cited these examples in order to show the extent of the absurdities that intelligent, educated persons will employ to convince themselves and others of the posthumous existence of the soul.

Only a few parapsychologists, especially in those nations where religion still occupies a substantial place in the individual's consciousness, do not now refute the ancient idea that some residue of the human personality continues to exist after the body dies, although perhaps only temporarily, gradually dispersing. Scientists who hope to see in parapsychology a new branch of scientific knowledge must still struggle with those who are drawn to the bosom of religion, spiritualism, and idealistic philosophy. We need only inspect several recent issues of the "International Journal of Parapsychology"* in order to get an idea of how much attention it pays to the problem of death and posthumous survival of the personality. Attempts are made to find in the hallucinations and last words of the dying arguments for the posthumous existence of their souls. A typical example of this is a monograph by the American parapsychologist Karl Osis entitled "Deathbed Observations by Physicians and Nurses."**

The author of this book distributed to medical workers more than 10 thousand questionnaires with questions about whether the dying appear to be in an exalted state of mind and whether they see apparitions and other hallucinatory visual images. A total of 640 completed questionnaires were received, from which the author drew the following conclusions. A fear of death does not dominate the feelings of the dying. Exaltation, a welling up of ecstatic feelings, is often observed. There are frequently hallucinatory visions, whose content corresponds to traditional religious beliefs. Hallucinatory appearances of ghosts are especially common, as if to aid the patient in passing

into the posthumous state. It should be added that in the majority of cases these assistants are the ghosts of the patient's dead relatives. Throughout all this it is strongly emphasized that these hallucinations and visions cannot be regarded as the result of drugs, fever, or other pathological factors capable of inducing hallucinations. Quite the contrary, such visions are supposedly experienced by completely conscious patients who react adequately to the situation around them.

Karl Osis attempts to give all his conclusions a scientific form. However, his tendency to try to persuade himself and others of the posthumous survival of some residue of the human personality is obvious to an unprejudiced reader. This is no longer parapsychology, but a return to belief in spirits.* Fortunately, a substantial number of foreign parapsychologists do not mix science with religion and have a negative attitude towards the fusion of parapsychology with occultism and mysticism.

Physiology and medicine have completely done away with the nonsense of spiritualism, irrefutably demonstrating that the psychic activity of an individual ceases at the instant when the organ of the psyche, the cerebrum, stops functioning.

The remarkable achievements of a recently developed branch of the medicobiological sciences called thanatology (the science of death) are very important for a sober scientific understanding of death and the phenomena that precede and follow it. The noted Russian scientist I.I. Mechnikov, P.I. Bakhmet'yev, A.A. Kulyabkov, N.P. Krakov, G.V. Shor, F.A. Andreyev, V.A. Negovskiy, and others played an important role in the creation of this new science. Its purpose is to study the pathological processes that develop in the moribund organism and lead to death (thanatogenesis), as well as to find methods of keeping the most vitally important organs from dying or even of restoring their

vital activity after they have ceased to function (revivification).

The factors responsible for death in man and animals are quite diverse, including mechanical injury or destruction of vitally important organs and poisoning of these organs with toxic substances introduced from without or produced within the body (poisons, bacteria, the toxic products of cellular decomposition, asphyxiation, loss of blood, etc.). However, the moribund state, referred to as the agonal period, sets in only when these factors have seriously disrupted the functioning of two vitally important structures – the heart, which maintains blood circulation, and the respiratory center, which is responsible for the respiratory movements of inhalation and exhalation.

There is a close reciprocal relationship between the functioning of the heart and that of the respiratory center: when cardiac functioning begins to deteriorate, the blood becomes more venous and the respiratory center is more strongly stimulated, which may cause it to enter a state of overexcitation and paralysis. Conversely, when the functioning of the respiratory center begins to deteriorate, the cardiac muscle receives less oxygen and its functioning is disrupted. Complete cardiac arrest soon causes the respiratory center to cease functioning, and vice versa. In some cases the heart stops first, while in others it is the respiratory center. This results in death of the body as a whole, clinical death in medical terminology.

Individual cells, tissues, and organs remain alive for long periods in a corpse protected against decomposition processes. True death of the body's cells occurs only when their physiological functions have finally and irreversibly stopped. Before this point is reached each dying cell passes through a unique state that cannot be called life (since its vital functions have already ceased) but cannot be recognized as death (since the lost functions can still be restored

under certain conditions). The noted physiologist N.Ye. Vvedenskiy (1901) called this transitional, intermediate state between life and death parabiosis.

A state of temporary arrest of all vital functions was discovered in certain invertebrates (rotifers, tardigrades, etc.) at the very beginning of the 18th century and later came to be called anabiosis. In an old book cited previously, Prof. Halle's "Magic, or the Magical Forces of Nature," we find the following significant words: "It seems that animals in nature can enter a state that is neither life nor death but a state intermediate between the two, which can be called living death." Farther on he writes: "simulated death may be the best way for man to prevent actual death: since the dead can neither starve nor suffocate, a person in this state could live without food or air."

This book also reports the first attempt to revive higher warm-blooded animals: "in the presence of several witnesses the Oxford professor Gerward opened one of a hound's veins, bled it until it showed not the slightest sign of life when tested by holding a mirror to its mouth, and then opened a vein in a prepared calf. The calf's blood was cleverly introduced into the open vein of the dog. As the calf's vitality ebbed, that of the dog was restored, so that it accepted food after a few hours. This dog was later again used for hunting and it could not be seen that the calf's blood had altered its natural tendencies."

Then the first Russian physiologist, Petr Posnikov was sent by Czar Peter I to the famous university at Padua. There, in the expression used by his contemporaries, he learned "to make live dogs die and dead dogs live." In 1848 A. Filomafitskiy, a professor at Moscow University, considered blood transfusion to be the only means for saving the dying. Systematic work on the revivification of higher animals

began in 1874, when the physiologist Schiff suggested that the heart be massaged by rhythmically squeezing it, while the pharmacologist Boehm at Derpt University undertook experiments on the revival of animals after fatal chloroform poisoning or asphyxiation.

At the end of the 19th century the French scientist C. Braun-Secar first succeeded in restoring cerebral functioning to some extent in experiments with a severed dog head. When deprived of its blood supply, the brain immediately stops functioning. If fresh blood is passed through the cerebral vessels (a technique known as perfusion) within a few minutes after the head is separated from the trunk, certain of the brain's functions are restored: the ears move, the eyes turn and blink, and the pupils again react to light.

The physiologist K. Heymans and J. Buchert later confirmed and extended Braun-Secar's observations. It was found that the cerebral cortex is especially sensitive to circulatory arrest. Restoration of its normal activity usually becomes impossible 8-10 min after decapitation. The initially reversible state of parabiosis in the cortical nerve cells passes into an irreversible state of biological death.

Other regions of the brain are more resistant and remain in the parabiotic transition state for longer periods. Thus, after functional arrest for 20-30 min the respiratory center in the myelencephalon can still be reactivated by perfusing the cerebral vessels with blood or oxygen-saturated physiological solution heated to body temperature (37°C).

The second engine of life, the heart, dies even more slowly. Prof. A.A. Kulyabko performed the following experiment at the begining of the present century. The heart of a cat, a rabbit, or even a human being was removed from the body immediately after clinical death and kept under refrigeration for several hours. Nevertheless, when heated

oxygen-saturated physiological solution was passed through the coronary system, the heart resumed its beating and continued to function for 2 or 3 hours. It will be recalled that the coronary vessels supply blood to the actual tissue of the heart, particularly the cardiac muscle.

The mechanism of revival of the isolated heart have recently been studied by Prof. S.V. Andreyev. In his monograph* he pointed out that restoration of cardiac activity is more rapid and complete in children and adolescents than in adults or the elderly. Using Tyrode's solution with certain hormones and vitamins added, Andreyev achieved complete restoration of cardiac activity 99 hours after clinical death. The character of the illness and the extent to which the brain is damaged by the pathogenic agents are decisive in obtaining complete, stable restoration of cardiac function. S.V. Andreyev reached the important conclusion that the human heart is in a parabiotic state during clinical death and for a prolonged period afterward.

There are also other methods for reviving the heart. Cardiac massage and passage of electrical discharges through the heart are now most commonly employed. The latter procedure is used in cases of cardiac fibrillation, i.e., very rapid, random contractions of the myocardial fibers (fibrillae), which can easily lead to cardiac arrest. Fibrillation is halted with a so-called defibrillator, a device that generates successive capacitor discharges.

All this shows that the parabiotic transition state lasts considerably longer in the dying heart than in the functionally arrested respiratory center. Of the three most vitally important functions, cardiac activity is most easily restored, respiratory movements are more difficult to revive, and higher nervous activity, without which restoration of the psyche, the individual's mental personality, is impossible, is hardest to revive.

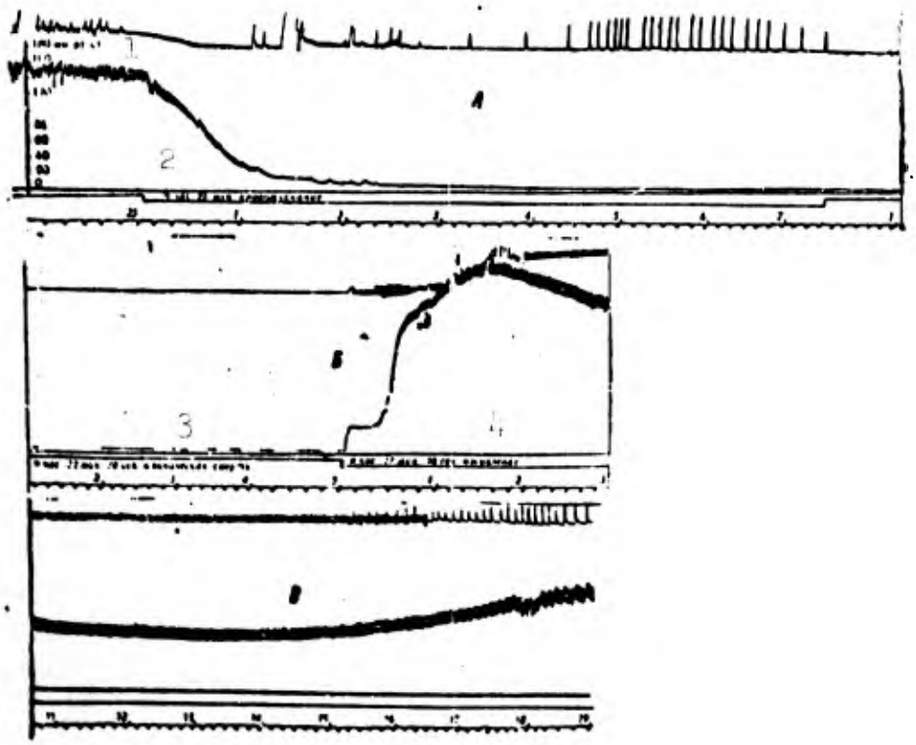
The experiments of F.A. Andreyev were a very important stage in the development of methods for reviving animals and human beings. In 1913 this researcher worked out a new technique for restoring the activity of the arrested heart in exsanguinated or poisoned dogs. It is based on the centripetal (moving toward the heart) forcing of natural or artificial blood (Ringer-Locke's solution) with adrenalin added, this being a drug that stimulates cardiac activity, into some major artery. When administered in this manner, the reviving fluid readily passes into the coronary vessels, which supply blood to the myocardium.

The revivification of higher animals within 6-8 min after clinical death can now be regarded as a completely proven fact. It is naturally possible only in cases where death occurs without destruction or anatomic injury of the vitally important organs.

By way of illustration, we can cite the results of an experiment involving the revival of a cat clinically dead as a result of exsanguination. This experiment was conducted by I.N. Yanvareva in the thanatological laboratory of the physiology department of Leningrad University* (see the figure on page ).

Before the experiment the cat was given heparin, a substance that prevents clotting of the blood, and placed under light ether-chloroform anesthesia; its respiration was normal and its blood pressure was approximately 160 mm Hg (see Fig. A). At 11:25 AM exsanguination was begun from a severed artery. The blood pressure, from which cardiac activity can be evaluated, dropped to 3-4 mm Hg after 2-3 min; the heart stopped, the corneal reflex disappeared, and respiration was intermittently arrested. The animal then took its final agonal breath and clinical death occurred at 11:32:30 (7 1/2 min after exsanguination began). Measures to revive the cat were begun at 11:37:30 (i.e., 5 min after clinical death). The blood previously taken from the animal,

heated and oxygen-saturated, was forced into the artery in the centripetal direction (according to Andreyev); at the same time, artificial respiration was carried out with a special apparatus and adrenalin was administered to stimulate cardiac functioning.



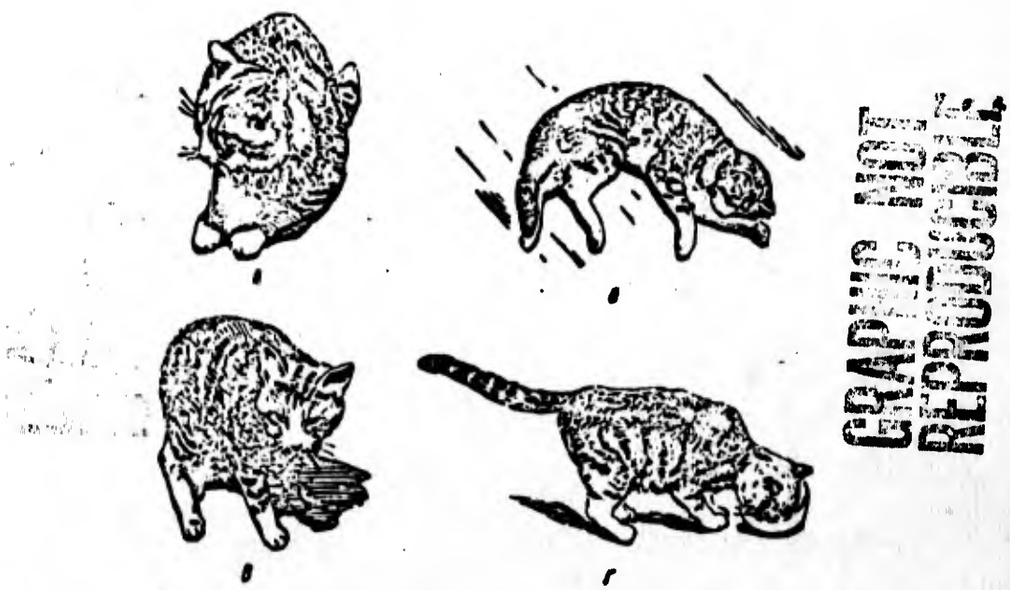

A. Death of cat as a result of exsanguination. The top curve represents respiratory movements, the middle curve is a record of blood pressure, and the bottom curve is a one-fifth second time marker; B) Period of clinical death and beginning of revival; C) subsequent course of revival. Appearance of independent respiratory movements. 1) mm Hg; 2) 11:25, exsanguination; 3) 11:32:30, clinical death; 4) 11:37:30, revival.

As can be seen in Fig. B, the blood pressure immediately began to rise and reached its original level after a minute and a half. The actual functioning of the heart was first restored after 30-40 sec. There was still no independent respiration at this time. Only after 14 min of continued artificial respiration did infrequent spontaneous inhalations of the agonal type begin to appear (see Fig. C). From this point onward the revival process went more rapidly: the pupillary and corneal reflexes were restored first, followed by the spinal de-

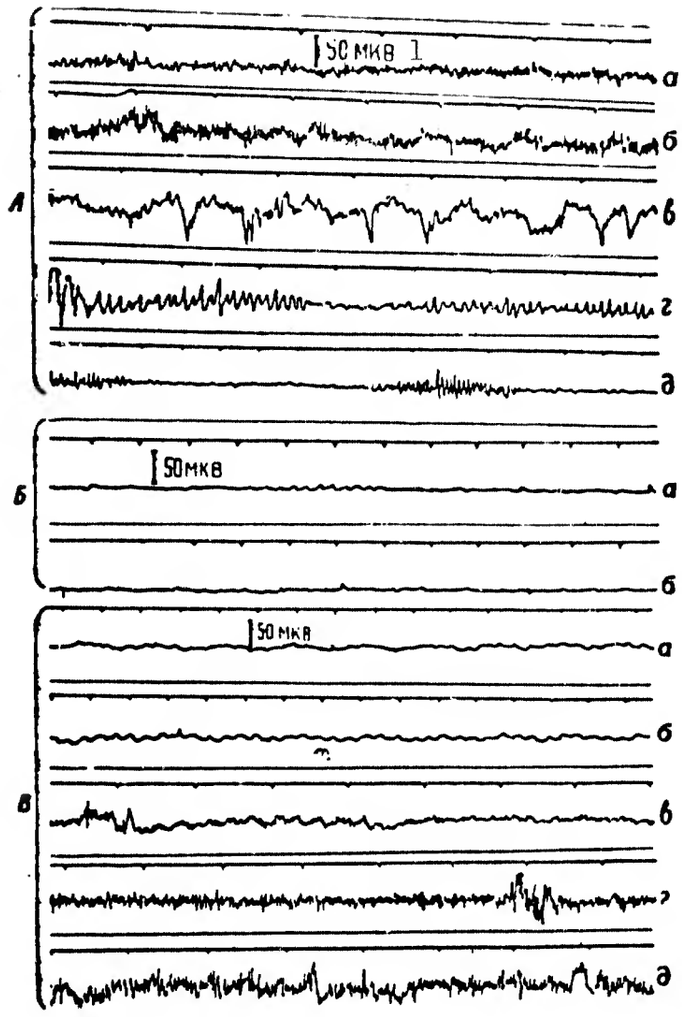
fensive reflex (in response to pinching of a paw). The central nervous system was gradually reactivated.

The photographs on page ) show the experimental cat before the experiment (A), one and one-half hours after clinical death lasting 5 min (B), one day after revival (C), and five days after revival (D); in the latter case the animal had fully recovered from its experience with clinical death.

The set of graphs on page shows what happened to the cat's cerebral cortex during the morabund state resulting from exsanguination (A), during the period of clinical death (B), and immediately after revival (C). In these experiments a steel needle electrode was inserted beforehand into a given area of the skull (in this case the area corresponding to the motor region of the cortex), its tip making contact with the surface of the brain; the other electrode was fastened to the animal's ear. The implanted electrode transmitted the electrical potentials of the cortex to a cathode-ray oscillograph through an amplifier. An electroencephalogram (abbreviated EEG) was recorded on photographic film by the oscillograph.



Experimental cat subjected to clinical death and then revived by the Andreyev-Negovskiy method. Explanation in text.




Electroencephalograms recorded from cat during the morabund state induced by loss of blood (A), during the period of clinical death (B), and during the restoration of cortical activity during revival (C). The time is indicated in seconds. The 50 μv (microvolt) figure is the scale of the biopotential oscillation. Explanation in text. 1) μv.

Segment a in Fig. A shows the cat's EEG before exsanguination, with the animal under light anesthesia; its blood pressure was approximately 140 mm Hg and the EEG was normal. Segment B was recorded 15 sec after exsanguination began; there was an intensification and acceleration of the biopotential oscillations, which indicated a temporary increase in cortical activity, or exaltation. Segment c, which was recorded after 1 min 45 sec, shows that depression of the cortex had started: the biopotential rhythm had slowed down and the strong low-

frequency oscillations regarded as a true sign of depression had appeared. The blood pressure had already fallen to 4 mm Hg and the ocular reflexes had disappeared. Segment d was recorded after 4 min 39 sec; the biopotential oscillations were attenuated at times, respiration was intermittently arrested, and the agonal period had begun. Segment e was recorded after 7 min 37 sec; the biopotential oscillations had taken on the form of isolated bursts (so-called spindles) separated by long pauses, as had the respiratory movements. The agonal phase was at its height; after a few last breaths clinical death set in.

It can be seen in the next figure (B) how the last scarcely noticeable fluctuations in the cerebral biopotential gradually died away (segments a and b).

The last figure (C) presents electroencephalograms recorded at various intervals after the revivification measures were begun. The heart started to function weakly after 30-35 sec. Rhythmic biopotential oscillations were registered in segment a, recorded after 1 min 33 sec, and even more markedly in segment b, recorded after 2 min 13 sec, but their rhythm coincided with that of the cardiac contractions. These were not yet oscillations in the potential of the brain itself, but the action current of the functioning heart picked up at the surface of the cortex. Only after 13 min 14 sec (in segment c) did oscillations in the cerebral biocurrent, still weak, appear. Low-frequency respiratory movements of the agonal type were restored at this time. In segment d, recorded after 26 min 9 sec, we can see a continuous series of cerebral biopotentials. The ocular reflexes and the spinal reflexes to pinching of a paw were reactivated. Segment e, recorded after 33 min 20 sec, shows that the biopotential oscillations had risen above their initial level, indicating a certain exaltation of the re-

vived cortex. The blood pressure rose to 115 mm Hg and the spontaneous respiration rate to 17 breaths per min. The cat was alive!

This victory over death,won by scientists, is of great theoretical and practical significance. Its theoretical importance lies in the fact that, if the functionally arrested brain can be restored to vital activity by administration of blood or a solution containing certain salts, this alone refutes the unscientific, metaphysical doctrine that the vital activity of the brain and the body is attributable to some unknowable "vital force." Moreover, if the organ of the psyche ceases to function immediately after cardiac and respiratory activity stop, this means that the soul, i.e., the psychic life of the individual, which is associated with cerebral activity, can in no way survive after the body dies. Conversely, it has proved possible to demonstrate that the body retains its vital activity for some time after the brain has been completely disengaged (after the brain has died). This means that the body can live when spiritual activity has been completely eliminated.

For example, if perfusion of the body's blood vessels with blood or reviving solution was begun too late, more than 10-15 min after the onset of clinical death, respiration and cardiac activity were restored but the functions of the brain could no longer be reactivated. The animal remained in a state resembling a deep coma, with its body musculature under constant tension, and finally died 10-20 hr after the experiment began.

It recently became known that the period of clinical death preceding revival could be substantially prolonged (to 60 min or more) in experimental dogs by hypothermia, i.e., gradually cooling of the body to 26-29°C. Similar experiments were also conducted on monkeys. In the investigations of V.A. Negovskiy and his colleagues, a monkey

subjected to clinical death for 30 min under hypothermia differed little in outward appearance from a healthy monkey 6 hr 30 min after revivification began. Under hypothermic conditions all vital processes are slowed down, metabolism is depressed, and the oxygen consumption of the tissues and organs is reduced. This explains the prolongation of clinical death possible with hypothermia.*

The practical significance of this type of research was demonstrated during the grim days of the Second World War. In more than 50 instances V.A. Negovskiy and his coworkers were able to revive wounded soldiers who had died of traumatic shock or loss of blood. It is true that some of them died within a few hours or days after artificial revival, as a result of irreversible damage to vitally important organs, but the others were literally snatched from the jaws of death. The following is one of these remarkable cases.

Soldier Ch-v was admitted to a front-line hospital 2 hr after being wounded in the right thigh. A few minutes after operating, the surgeon pronounced him dead of shock and acute loss of blood; no pulse could be felt, his heart had stopped beating, he was no longer breathing, his pupils were dilated to the maximum, all his reflexes had disappeared, and the muscles of his body were completely relaxed. Clinical death had occurred.

After 3 1/2 min Prof. Negovskiy applied his method, forcing blood simultaneously into an artery and a vein and giving artificial respiration. Cardiac activity was restored after 1 min, independent respiration returned after 3 min, and the brain began to revive after 22 min, when the ocular reflexes reappeared; the patient showed the first signs of regaining consciousness after 60 min. One day later he was able to read a book and he eventually made a full recovery.

Here is another case reported by V.A. Negovskiy, in which he em-

ployed a different revival technique: "The patient, a physician 65 years old, felt pain in the vicinity of his heart and naturally went to a hospital. An electrocardiogram established that he was suffering from myocardial infarction. He apparently did not give requisite heed to the diagnosis and left the hospital. After going a short distance he lost consciousness and was admitted to a first-aid station within 2 minutes. His chest was opened and cardiac massage and artificial respiration were given. It was established that ventricular fibrillation was present. The first four applications of electric shocks had no effect (the fibrillation was not halted, this occurring only after the fifth application of the defibrillator – Author). The fifth shock, given 26 min after the massage was begun, stopped the fibrillation. The patient regained consciousness on the following morning. He had no memory of the events of the preceding 36 hours. He subsequently made a full recovery and returned to work."*

Revival procedures can also be employed in certain other fatality cases, including those resulting from drowning, carbon monoxide poisoning, electric shock, myocardial infarction, etc. As might be expected, however, the brain of a human being has been found to be more sensitive to circulatory and respiratory arrest than that of a dog or a monkey.

The duration of the parabiotic transition state for the human cortex is 5-6 min (when hypothermia is not employed). Before the end of this period the vital activity of the cortex and psychic activity itself can still be restored. After the critical period has elapsed, however, the brain, the psyche, and the individual's consciousness are irreversibly dead. This is an immutable law of nature. Every reasonable person should understand this and have done once and for all with illusions of posthumous survival.

Let us remember the line of poetry, full of human dignity, that runs: "I have been, I am, I have no need of eternity!"

Neither should we forget the wise precept of D.I. Mendeleyev, who fought mightily against "scientific" superstitions. He said that, in order to combat idealism and mysticism successfully, it is necessary to make a patient and yet bold study of all the neuropsychological phenomena that give rise to religious beliefs and to prejudices and superstitions of all kinds. "These phenomena," wrote Mendeleyev, "should not be ignored, but must be considered in detail, i.e., we must learn which of their elements belong to the realm of known natural phenomena, which are illusions and hallucinations, which are shameful frauds, and, finally, which must be regarded as presently inexplicable phenomena taking place in accordance with as yet unknown natural laws. When so considered such phenomena will lose the imprint of mysteriousness that attract so many people to them and no room will be left for mysticism..."*

These wise words, which caution us against prejudice and a priori denial but also urge watchful discretion and a strict critical attitude, have been the author's guide in writing this book.

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[Footnotes]

170 See Maurice Maeterlinck, Smert' [Death], Authorized translation by I. Ardenin, St. Petersburg, 1914.

171 International Journal of Parapsychology, Parapsychology Foundation, Inc., N.Y.

171 K. Osis, Deathbed Observations by Physicians and Nurses, Parapsychology Foundation, Inc., N.Y., 1961.

172 Since 1963 there has been published in the United States a "bulletin for research on the survival of the personality after bodily death." Its name, "Theta," is derived from the

initial letter of the Greek word "thanatos," meaning death. This journal has set itself the task of studying experimentally the "residue" of the personality that supposedly continues to exist after death.

176 See S.V. Andreyev, Vosstanovleniye deyatel'nosti serdtsa cheloveka posle smerti [Restoration of Human Cardiac Activity after Death], Moscow, 1955.

177 See I.N. Yanvareva, Izmeneniye elektricheskoy aktivnosti prodolgovatogo mozga i bol'shikh polushariy v period umiraniya, klinicheskoy smerti i ozhivleniya zhivotnykh [Changes in the Electrical Activity of the Myelencephalon and Cerebrum During the moribund period, clinical death, and revival in animals], Vestnik LGU [Herald of Leningrad State University], Biological Sciences Series, No. 9, Issue 2, 1959, page 87.

183 See V.A. Negovskiy, Ozhivleniye organizma i iskusstvennaya gipotermiya [Revival of Organisms and Artificial Hypothermia], Medgiz, 1960.

184 Ibid., pages 243-244.

185 From Mendeleyev's "Proposal" to the Physics Society at Peterburg University regarding the establishment of a commission to consider phenomena referred to as mediumistic (6 May 1875) (see D.I. Mendeleyev, Materialy dlya suzhdeniya o spiritizme [Materials for an Evaluation of Spiritualism], page 3).