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neglect His command¹ to pass on the blessings of the Faith to those who do not know them? And, worst of all, what desire can there be to enthrone Him as King over all the kingdoms of the world?

Or, to take Stephen's other principle of spirituality of worship and freedom of access, is there no fear to-day of a ceremonialism which is as dead and formal as anything in Judaism could have been? Are there no priestly claims which are as arrogant as any that ever barred mankind from coming, through Christ, "boldly unto the throne of grace"?² Would that the Church in all ages had been wise enough to read in this inspired record of the Church's earliest age the principles which would have kept it pure, vigorous, expansive, and fruitful! Are we wise enough to do so now?

Stephen's story, and Stephen's speech, are full of points which might doubtless be amplified to almost any extent; but our study of this great epoch will not be thrown away if the main lessons of the crisis are impressed upon us, and its principles translated by us into action, in our own work of witness.



Spiritual Phenomena in the Light of Electrical Science.

By JOHN F. COOTE, A.M.I.E.E.

TO the Christian, spiritual communion is such an axiom of his religious life, that he is sometimes apt to accept this inestimable privilege without attempting to understand the working of such a mystery. He believes that God speaks individually to him, putting into his mind "all holy desires, all good counsels," yet if he were asked to explain how this could be, he would often probably be at a loss to do so.

Most of us, I suppose, think of it in some vague way as an

¹ Cf. John xiv. 15 (R.V.), and xv. 14.

² Heb. iv. 16.

“action at a distance,” just as in the early days of electrical science, the attraction or repulsion between two charged bodies or two magnets was accounted for, and probably our efforts to understand this wonderful phenomenon stop short at that point.

But to-day the scientific attitude of mind has so permeated every department of knowledge that we are not content with merely accepting any phenomenon as a fact, but endeavour, if possible, not only to discover the causes that are at work to produce the observed effects, but also to ascertain the mechanism by which such effects are brought about.

Although, in matters of religion, faith is the paramount necessity, yet it is always a benefit to find any objective evidence which tends to confirm what has been accepted by faith, for the fact of finding that one thing which we have thus accepted has proved to have at least its analogue in a natural phenomenon well understood by Science, must inevitably give us an increased confidence in adhering to other beliefs which we have received purely by faith.

Can we, then, go no further than merely to accept the belief that God does communicate His thoughts to man? Has Science, which has helped us so much to understand other phases of our spiritual life, nothing to say about this particular one? Surely not! “For the invisible things of Him since the creation of the world are clearly seen, being perceived through the things that are made.”

In his fascinating and suggestive book, “Natural Law in the Spiritual World,” Professor Drummond has remarked that “the material for Parable lies unnoticed and unused on the field of recent Science in inexhaustible profusion.” That book is a contribution from Biology to Religion, throwing a flood of light on many phenomena of the spiritual life, and it would be strange indeed if electricity, that branch of physical Science which has to-day penetrated more deeply into the realms of the unseen than any other, could not do something to help men to a clearer understanding of some of the mysteries of Life.

Till within comparatively recent years there was probably

no phenomenon in Nature which would throw much light on the "mechanism" of spiritual communion, but of late one branch of Science has been developed and made familiar to the general public, which it seems to me may do so. Much has been written on the subject of electric waves from the time when Hertz first experimentally demonstrated their existence in 1888, up to the present day, which has witnessed the successful working of etheric or wireless telegraphy; but no one, as far as I am aware, has pointed out what may, at any rate, be a most striking analogy to that phenomenon of the spiritual world which we are considering.

Etheric telegraphy has shown us a sending apparatus throwing out into space a train of waves which are conveyed by the ether—that imponderable medium which pervades the universe—and impinge on some receiving apparatus many hundreds of miles distant, which, by its marvellous sensitiveness to these waves, is able to receive the message despatched so far away; so that there is established a perfect means of communication without any visible connecting link by which it is brought about. Already this wonder, which such a few years ago would have been regarded as an impossibility, is a commonplace of our existence.

And now looking from the things that are made to the invisible things which we are seeking to understand, does it not seem that we have here at least a conceivable representation of how the spiritual force we believe in may be exerted?

It does not do to press an analogy too far, but the more facts it is capable of elucidating, the more useful it becomes. Let us, therefore, consider one or two well-known phenomena of the spiritual life which the present analogy might serve to explain.

We have been able, from our observation of the working of wireless telegraphy, to form a conception of God transmitting His will in thought throughout His universe, and these inspirations acting on the minds of men here on this earth. To all men, if they willed it so, such inspirations might come, but alas!

all do not receive them. It is one of the strangest traits in human character that man, to whom such a capacity for apprehending God has been given, should be so often utterly irresponsive, and still worse that he should be contented to be so. But if we further consider the electrical analogy, we see at once the explanation and the reason why he must ever remain thus, unless his mind undergoes a radical change.

In wireless telegraphy, in order that two stations should be able to communicate with one another, it is necessary that the apparatus at the receiving station should be "tuned" to that of the transmitting station, which is sending out waves of a particular rate of vibration. This tuning is done by suitably adjusting the electrical values of the receiving apparatus, which will then be sensitive to the waves which fall upon it, whereas the apparatus at another station in close proximity, but not so adjusted, would entirely fail to respond. So we have a radiating circuit sending out a train of waves through space which fall upon, perhaps, many receiving circuits, all of which have a potentiality for response, but only those actually do respond which have been tuned to the radiating source.

And so in the spiritual world we see that there is no arbitrary selection at work conferring on some the privilege of hearing the voice of God and denying it to others; it is only that the latter are not in unison with the mind of God, and are therefore unable to respond to those mysterious undulations traversing the realms of space—the breath of the Spirit. Sin has made them irresponsive, and they must continue so until they have, with humble and contrite hearts, besought the Lord and Giver of Life to tune their souls to His. And as we think over this, a new light seems to come to the familiar words, "They have ears to hear, and hear not."

And just as the tuning of two stations to each other's signals renders it more or less difficult for another not so tuned to interfere, so when man by the harmonizing of his will with the Divine Will has been able to enter into correspondence with God by inspiration and prayer, it becomes difficult for the world

to interrupt that communion. For "the world knoweth not God"; it is out of tune with Him, and its discords fall unheeded on the ear which is only listening for the voice of God.

So far, then, we have tried to trace out an analogy between the spiritual phenomenon of communion between God and man, and a natural phenomenon with whose working we are familiar and which we can readily comprehend. And to some it will perhaps seem that there is nothing more in all this than a helpful analogy; but useful though it may be in this way, if we think much about the matter, we cannot help wondering whether something very similar to this may not be what actually does take place.

Of a like nature, though on a lower plane than communion between God and man, there is another phenomenon awaiting explanation—telepathy, the communication between man and man by other than the recognized channels. This subject is now beginning to receive serious attention, for there is too much evidence available to doubt its existence.

In the old days, in studying the action of electrified bodies on one another, little attention was paid to the intervening medium; but when Faraday took up the subject, he showed what an important part the ether played in forming the connecting link between the body acting and that acted upon, and that every observed "action at a distance" depended on it for its manifestation, so that in any mental picture of such electrical phenomena we have always since then associated the three together.

Now, all the subtler manifestations of energy take the form of wave propagation through the ether from a radiator to a receiver, and if thought, which is perhaps the highest form of all, can be transmitted at all, it should naturally be transmitted in the same way.

Little is definitely known as yet with regard to the nature of thought and its production by the brain. It is generally considered as due to molecular changes in the brain substance, which changes are accompanied by a rise of temperature. Heat

is always the sign of motion of some kind, and whenever a body is in motion it gives rise to similar movements in the air or the ether. It seems reasonable, therefore, to suppose that thought waves are possible.

Assuming they do exist, it would seem only natural to expect that they would be conveyed by the same medium as the other higher forms of energy. There is no essential difference between waves of heat, light, or electricity. They are all ether waves, differing only in the rapidity of their vibrations, and it is surely hardly going too far to imagine that this universal medium may have yet another function in the scheme of the universe—the transmission of thought waves.

Lastly, there is the receiving end to be considered. Is the human brain capable of being acted upon by a train of thought waves, did such exist? We perceive radiant heat by the nerves of the skin, and light by the nerves of the eye. In the case of electric waves we have no specialized sense organ by which we can perceive them, but some very interesting experiments, carried out by Mr. A. F. Collins, of Philadelphia (*vide The Electrical Review*, May 23, 1902), show that the brain is capable of acting in an exactly similar manner to a coherer in wireless telegraphy. One of the simplest forms of coherer consists of two short silver rods, placed end to end, but which are separated by a space of about one-fiftieth of an inch containing a minute quantity of nickel and silver filings. The rods and filings are sealed up in a small glass tube from which the air has been exhausted. This coherer is inserted in the circuit of the receiving apparatus, and a battery is also in circuit with it; as long as no electric waves impinge on the coherer, the resistance offered by the loose filings to the passage of a current is so great that none passes, but directly a wave reaches the coherer it causes some change to take place therein, which results in its resistance being decreased to such an extent that a current flows and a signal is recorded.

Now, in the experiments referred to, it was found that a living brain acts exactly like a coherer when electric waves

impinge upon it, the nerve substance undergoing a similar change of resistance, and when it forms part of an electric circuit it can allow currents to pass or stop them, according as it is acted upon by electric waves or not. The experiments are particularly interesting in connection with the present subject, because they prove that the brain is sensitive to electric waves, and it is therefore quite possible that it would be responsive to thought waves.

Since this article was written, the author has learnt that the idea of ether waves passing from one brain to another has already been put forward as an explanation of telepathy, though it has apparently not found very great favour amongst psychologists, chiefly on account of certain phenomena which it would not seem to adequately explain. These, however, cannot be discussed here. One of the objections urged against it, curiously enough, is the case of "collective telepathy," where the impressions from the "agent" affect not only the friend at a distant place, but also, it may be, certain strangers who are present, while other persons in the same spot or elsewhere are unaffected. This would seem analogous to the case in the spiritual world referred to above, of some being irresponsive to the voice of God, while others are alive to it, and the explanation of "tuning" there suggested might equally serve for the telepathic phenomenon. However this may be, telepathy is so admittedly difficult of complete explanation on any hypothesis yet adduced, that in the present state of knowledge, the ether vibration theory cannot be ruled out as an altogether impossible one.

From the physical standpoint, then, there would seem nothing essentially improbable in these ideas which are put forward by the writer solely in the hope that they may perhaps be of some help to others in these days when there seems to be so much that threatens to undermine "the faith which was once for all delivered to the saints."