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**THE IMPORTANT FACTOR—RESISTANCE, INDUCTANCE
OR CAPACITANCE?**

LEO BIGELMAN, M.D.
College of Electronic Medicine,
San Francisco, California.

Ever since ERA first became a storm centre and consequently the focus of many theories and reasons why, one of the most important and most puzzling questions in connection with it has been the one regarding the nature and the function of the resistance coils in the reflexophones and in the Oscilloclast. At one time the theory that these coils acted purely as resistances held sway—this for the reason that these coils are non-inductively wound. Needless to say such a hypothesis could not hold its own for long because it did not explain any of the phenomena and took no cognizance of the character of the energy involved which was transmitted thru these coils. Then were advanced the suppositions that inductance and capacitance were the important factors, but no proof was forthcoming to support these suppositions. About the same time a favorite explanation arose to the effect that at certain settings of the reflexophones the coils were in resonance with the energy from the blood specimens, thus amplifying that energy and stimulating the reflexes, but here no attempt was made to reduce this idea of resonance to its basic components which would have been shown to be synonymous with inductance and capacitance. This same idea was applied to the coils in the treating units but here a kind of choking effect was ascribed to them which was assumed to account for the modifications produced by changing the rates. Again we deal with theory unsubstantiated by proof.

Two investigators have come nearer to proving certain points than any others—one is T. P. Hall of Vancouver who by his use of condensers instead of rheostats in his diagnostic and treating circuits has definitely demonstrated that part which capacitance plays in the production of these phenomena; the other is Boyd of Glasgow who by the use of his emanometer which is essentially only an inductance coil of low ohmic resistance and a condenser has demonstrated the role of both inductance and capacitance, but has not necessarily eliminated resistance despite the low resistance of his inductance coil because in tuning, varying lengths of that coil must of necessity be used. It was with the

view of shedding more definite light on this problem that we devised the following experiments.

Using No. 14, copper wire, insulated, we made a coil of an indefinite number of turns wound inductively whose total resistance was less than one ohm. We then introduced this coil between the unit and the cord leading to the treating electrode—the electrode was directed at the dynamizer in the diagnostic circuit. The coil which was thus introduced was permitted to swing freely and the various turns were not held together, in order to permit decreasing and again increasing the number of turns. As some of the turns were unwound the wire thus removed from the coil was straightened out, the total amount of wire, you will observe, always remained the same, only the number of turns being altered, therefore there was no change in the resistance of the system, but the inductance could thus be varied at will with resistance a constant. Using such an arrangement with the Oscilloclast unit set at zero we were able to get dissipation of each reaction given by the blood specimen within the dynamizer, by simply increasing or decreasing the number of turns in the coil, employing a resistance less than one ohm instead of different hundreds of ohms ordinarily required when determining rates with the Oscilloclast proper, which were also determined in these experiments, but no definite relationship was attempted between the settings on the Oscilloclast and the number of turns corresponding to it on the one ohm coil, because all the elements of the coil employed could not be standardized. This test proves most conclusively that resistance is **not the factor in "tuning" treating rates**; it further shows that inductance is undoubtedly the chief factor, but does not rule out capacitance because that is present in any system, and its effect was demonstrated in these experiments by separating the turns in the coil from each other beyond a certain distance in which case the effect upon the reactions was cancelled, but would reappear when the inductance was again changed but the respective position of the coils to each other retained. This proves that inductance and capacitance must be in a certain ratio to each other to obtain reactance and apparently conforms to the general law for such systems as stated by the formula.

$$X = 2\pi fL - \frac{1}{2\pi fC}$$

You will notice that X, reactance is directly proportional to the

inductance L , and inversely to the capacitance, C . Before the point of resonance for any system can be determined the value of X must be determined, so it is evident the point of resonance is directly dependent on these two factors.

Our next group of experiments employed a similar coil as the sole diagnostic apparatus. This was connected between the dynamizer and the subject and "tuning" achieved by unwinding and rewinding various numbers of turns, the unwound wire always being kept free of kinks and turns and as nearly as possible in a straight line. Using such a coil with a total resistance of less than one ohm, we were able to bring in reactions on different areas of the abdomen, showing that varying inductance primarily "tuned" in and out the different energies in the blood specimen. These reactions were annulled with different rates on the Oscilloclast, or with a change in the number of turns in a coil used in the manner described in the first part of these experiments. This apparently proves that the same law holds true in both our diagnostic and treating circuits, and that one is a harmonic of the other. It proves definitely, however, that resistance is not the factor as the resistance in all these tests was uniform, while the inductance was altered primarily.

This, however, did not prove everything, because you must remember that the coils within the reflexophones and within the units are non-inductively wound, and on superficial examination it would seem that our experiments were not at all apropos. The wire used in winding the coils of the instruments is doubled on itself before it is wound. This is supposed to cancel any inductance effects, and does where the wave or cycle employed is large enough to cut across both wires, but suppose it does not, suppose the frequency is very high as is probably the case with the types of energy under consideration, then there would be little or no neutralization of inductance effects, not only that, but if the frequency is high enough then only a short length of the wire making up the coil is traversed by the energy because most of it jumps across at the very beginning, so that with very high frequencies resistance becomes a negligible factor, in which case our experiments would apply. Let us assume, for the sake of further investigation that these coils are non-inductive in the manner and for the purpose used, we then have the consideration of the effect of these coils on each other, in other words, the mutual inductance between coils, and the fields created between them.

The coils in the Oscilloclast units are placed in a circle, those in the reflexophones in a semi-circle. To all intents and purposes this constitutes a series of coils made up of non-inductively wound coils instead of straight wire, consequently there will be a field of mutual inductance between these non-inductive coils just as there is between the turns of an inductively wound coil. If this point is clear, everything becomes self-evident. The following experiments prove this contention as well as supporting the belief that the frequencies dealt with are high enough to minimize the resistance effects of the coils.

Instead of using a single inductively wound coil, we employed a number of non-inductively wound coils the total resistance of which was less than one ohm. With the unit set at zero we introduced one of these non-inductive coils in series with the treating wire and electrode, and noted its effect upon reactions. If there was no effect we added coils in series with the first until a dissipating effect was obtained. This dissipating effect repeated itself consistently for the same number of coils and the same reaction. **If the distance between these coils was altered the effect was destroyed. This can only mean that the field which was the resultant of the inductance and capacitance was altered and was consequently due to these forces.** Again if we obtained dissipation with a certain rate on the Oscilloclast and introduced a small non-inductive coil in series practically no variation occurred, **but if more than one coil was added then the rate changed.** This again proves the modification of the field because of the **mutual inductance between non-inductively wound coils.**

Using multiples of non-inductively wound coils, the total resistance of which never exceeded one ohm, as the sole means of "tuning," we were able to elicit reactions on different areas of the abdomen duplicating our results formerly obtained with the inductively wound coil, in other words, diagnostic "tuning" was obtained by increasing or decreasing the number of coils in series. It is obvious, that except for the resistances these experiments duplicated in their arrangement the conditions which prevail in the reflexophones and in the Oscilloclast units, where series of non-inductively wound coils of varying resistances is employed. This latter series of experiments confirms the first in every detail and conforms to the same mathematical law stated above.

These experiments are by no means complete. Before a final conclusion can be reached they should be repeated with carefully constructed coils whose reactance has been determined before comparative tests are attempted. It would then be possible to interpret the values of our different settings both on the diagnostic and the treating apparatus, and a definite mathematical value in fundamental terms established. This would divorce us entirely from the idea that the instruments express in any way resistance phenomena. From the evidence which these experiments present we feel justified in drawing the following conclusions:

1—That resistance as such plays no part in the "tuning" characteristics of the apparatus, because in the first series of experiments the resistance was always the same and less than one ohm, and in the second group of experiments the total resistance was never in excess of one ohm, and the variations always fractions of an ohm, yet the results of the changes made were very decided and very consistent.

2—That inductance and capacitance are the essential factors involved, inductance perhaps more than capacitance, altho variation of the latter had almost as profound an effect as variation of the former.

3—That altho the individual coils within the reflexophones and the units are non-inductively wound, nevertheless their mutual effect is one of inductance.

4—That because a variation of a turn or two or less often produced a profound effect, a minute variation in inductance and capacitance is responsible for a marked difference in the frequencies observed, which substantiates the assumption that the frequencies are comparatively high. If that is so, then the measure of resistance of the coils in our apparatus in no way represents their resistance, if any, to these frequencies. It further follows as an essential corollary of this deduction, that a series of non-inductively wound coils is a means of obtaining minute variations in inductance. This harmonizes the known action of the diagnostic and treating apparatus and the conclusions forced by the above experiments.

5—That further basic research and experimentation will reveal the harmony existing between the phenomena observed in the study and practice of ERA and the laws discovered by investigation in the realms of physics.

NOTES FROM THE FIELD.

Doctors H. C. and Grace Urban of Cedar Rapids, Iowa, announce the arrival of Lawrence Edward Urban, April 27, 1926. The College extends its congratulations and best wishes, and looks forward to a new supporter of ERA.

Dr. Mary Lecocq, Jonesboro, Arkansas, has removed to new quarters where she will have one building for office work and another for use as a hospital—a rather forcible vindication for ERA and the Court that upheld her.

Dr. W. H. Gillmore who is affiliated in practice with Dr. S. M. Moulton, located at 920 Nicollet Avenue, Minneapolis, Minnesota, has been and will continue to broadcast a series of lectures on Physio-Therapy from Station W. R. H. M., Rosedale Hospital, Minneapolis, Minnesota. This lecture is delivered every Sunday night at 10 o'clock, Central Standard Time.

Dr. Gillmore is a member of the staff at Rosedale Hospital and has recently assumed charge of the Physio-Therapy Section. Any suggestions as to subject matter that will help to improve this series of lectures will be appreciated from the field, especially from those who are interested in Physio-Therapy as an adjunct to their practice.

Dr. Herbert McConathy has moved into new offices, 815 Seybold Bldg., Miami, Fla. In renewing subscription to Physico Clinical Medicine he writes:

"Your Journal is getting better with every issue. I like it immensely. Please be sure I get the February-March issue.

"My hobby is constructive rates. Please give us all you can possibly dig up about them; every detail."

We certainly feel that our work is well done when a letter of this kind is received. More suggestions from ERA doctors will help us to make the Journal more interesting. A contribution of 300 to 500 words on any subject will be appreciated—we only ask that such article be for our exclusive use in order to avoid duplication in other Journals.

South Orange, N. J., April 19, 1926.

College of Electronic Medicine,
San Francisco, California.

Dear Sirs: Enclosed herewith is my check for the current month's payment to the Honorarium Fund.

I have never written you of my attitude towards this fund. Possibly you will be interested.

I signed the original contract for the Oscilloclast with "My eyes open." I understood fully what I was "letting myself in for." As the funds were to be used for an endowment for the College and for research work I was willing to make the payments specified.

After the death of Dr. Abrams misapprehension as to who would benefit by the payments made caused me, with many others, to uphold payment until the matter could be settled.

During this time a sizeable balance against me accumulated.

Then came the HONORARIUM FUND PLAN with the adjustment of accrued rentals on the new basis with the result that my debt was reduced a great deal and future payments were to be about one-third of the former. Needless to say I was delighted.

I was legally and honor bound to pay the original amount without reduction. I was also bound to pay the monthly rentals without reduction so long as I kept the Oscilloclast. I am aware that the College might have difficulty in collecting or doing anything except repossess the Oscilloclast. Since the College has voluntarily reduced my debt and monthly payments (this is what the HONORARIUM FUND PLAN amounts to), I am bound by another tie, Gratitude. The reduction does not in any sense reduce my legal obligation to pay the amount even though it is called "Contribution" instead of "Rental."

Since I have discharged my obligations by paying up, why do I keep on paying as I have been doing for the past several months? Every few days I receive literature offering what is claimed to be a better machine which I may purchase outright and thus be free from this monthly payment. Why don't I buy one of them?

I believe firmly in the future of ERA. The results in my own office convince me of its very great merit.

I believe, as the current number of Physico-Clinical Medicine clearly shows, that the Oscilloclast is an evolutionary product, and is today the best instrument of its kind on the market.

With the renewed interest in ERA and the increased business as indicated by the responses to your questionnaire the item of legitimate ERA service will be of increasing importance. When

the demand for ERA treatment reaches a point where we appear to be making money the faker will become a serious problem.

The Oscilloclast is the only instrument which is definitely controlled by an ERA organization. All others being sold outright, every Tom, Dick and Harry may obtain one. With control of the Oscilloclast resting in the College of Electronic Medicine I feel sure that when the demand for ERA service does increase to a point that is attractive, financially, some chiropractor or other incompetent practitioner in my neighborhood will not install an Oscilloclast. This I feel is a great protection to me in my ERA work. It is the ONLY protection from unfair competition that is in sight. And possibly of equal importance, it is the ONLY assurance the public has that genuine ERA service is being given.

Yours fraternally,

F. E. KEEFER, DO.

Dr. Keefer states so clearly one side of a difficult and much debated question that we reprint his letter in full. It expresses the spirit that has kept ERA going thru all these years of trial, and with support of this kind will keep it going. We would like to receive more expressions of this kind.

REPORT (Abridged) OF MEETING UNDER AUSPICES OF EASTERN ELECTRONIC RESEARCH ASSOCIATION.

Dr. Alexander Smith.

On Monday, March 29th, a large audience assembled in the Town Hall, West 43rd Street, New York, under the auspices of the Eastern Electronic Research Association, to hear a lecture on "Dr. Abrams the Man and His Work," by Mr. Alexander Marky.

This meeting was called in response to an ever-growing demand for reliable information on this method of treating disease, that is increasingly engaging the interest and research effort of advanced medical thinkers the world over.

Dr. Eugene Underhill of Philadelphia, due to a slight indisposition, was unable to be present to deliver the illustrated lecture: "The Story of ERA in Pictures," and Mr. Marky kindly agreed to take his place.

The officers and members of the Eastern Electronic Research Association feel that in promoting such meetings they are doing a necessary and effective service for the advancement of ERA in spreading the knowledge of its scientific accuracy and of its supreme value in the treatment of disease.

MEETINGS OF NORTHERN CALIFORNIA ERA MEN.

Since the last issue of this Journal two meetings have been held, the first, April 3, 1926, with Dr. Frank Chaffee presiding; the second, May 1, 1926, with Dr. M. E. Thomas presiding.

Dr. J. A. McRoberts, of Hot Springs, S. D., who has been in California because of his health, was a very interesting visitor at the April 3rd meeting. He gave a short talk on his Streborcam, the mechanical subject.

There was a general round table discussion on the subjects of publicity, individual weaknesses in our ERA work, aids in diagnosis, diet and ERA treatment, standardization of fees, and complicating factors in the progress and detection of various diseases. Discussions of this type have the effect of a general housecleaning, and each man leaves a little more sure of the work and of himself. The importance of supportive treatment besides ERA was stressed by Dr. Chaffee, with more or less general concurrence.

Dr. Metherell cited some cryptogenic rates which he found useful in diagnosis. We print those which are original with Dr. Metherell. Cryptogenic Malaria, 32-5; Cryptogenic Psora, 48-33; Cryptogenic Avian Tuberculosis, 34-41; Catarrhal Bacillus (new) 18-41 and 31-41; reaction to right of Umbilicus E. D.; Cryptogenic Colisepsis, 46-29.

Dr. Evans reported on the electronic testing of foods and drugs, stating that results following the use of tested foods and drugs exceeded the usual results of treatment.

The general meeting has each time been supplemented by a practical demonstration of some theoretical problem, in the College laboratory. This phase introduces a touch of the unexpected into the meetings, which makes them all the more interesting.

The next meeting will be held June 5, 1926, with Dr. E. Lee Burch presiding. The subject for the evening is "ERA and Children."

NOTES ON SPONDYLOTHERAPY.

Vertebrae and Nerves	Freezing over gasserian ganglion in front
Cranial	5 of ear relieves trigeminus neuralgia.
Cervical	1 & 2 Freezing inhibits functional sensibility of trigeminus neuralgia and its spinal branch.
	2-3 A. Pressure or freezing inhibits irritability of phrenic nerve.

- B. Elicits reflex of diaphragm.**
- 2 & 3** Percussion stimulates the phrenic nerve and the diaphragm, and the adrenals.
- 1 to 7** Freezing inhibits irritability of cervico-occipital nerves.
- 4-5** Lung reflex of contraction. Useful in asthma.
- 5 & 6** Right paravertebral tenderness in syphilis.
- 6** Stimulates parathyroids. Enlarges spleen.
- 7** Contracts thyroid and thyms. Stimulates pituitary and vagus. Contracts heart and blood vessels. Vaso-constrictor, arrests haemoptysis, migraine, etc.
- Dorsal**
- 1** Vaso-constrictor nerve antagonizes depressor nerve, increases visceral tone of sigmoid flexure.
- 7 & 2** Mydriasis. Grounding 1st and 2nd makes sluggish Argyll-Robertson pupil more responsive to light.
- 2-3, 3-4, 4-5** Contracts splanchnic vessels in neurasthenia.
- 3** Closes pylorus and opens cardiac orifice of stomach.
- 3 to 6** Left side painful in heart affections.
- 3 to 8** Lung reflex of dilatation.
- 3-4** Activates thyroid thymus and mammary glands, depresses pituitary. Through depressor nerve gives splanchno-vascular reactions.
- 4, 5 & 6** Contracts gall-bladder.
- 4 to 7** Painful on pressure when a lesion is located on the lesser curvature of the stomach between the cardia and pylorus. At spine or side of 10th dorsal in lesion of the fundus. 10th to 12th dorsal when lesion is in greater curvature near pylorus.
- 5** Splanchnic nerve. Antagonizes depressor nerve: grounding either, accentuates the action of the other. Opens the pylorus.

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|----------------------|----------|---|
| | 5, 6 & 7 | Contraction of the splanchnic vessels. |
| | 6, 7 & 8 | Acts on kidneys, increases diuresis. |
| | 7 | Diminishes activity of ovaries. |
| 8 or 9 or 2nd lumbar | | Right side tender in appendicitis. |
| | 9 | Distends gall-bladder, increases ovarian function. |
| | 10 | Vaso-dilatation. Lung reflex of dilatation. Stimulates pancreas and testicles. Empties appendix. |
| | 10 & 11 | Right side and tip of 11th right rib tender on pressure in cholecystitis. |
| | 10 & 12 | Renal affections tender on side of disease. |
| 10, 11 & 12 | | For prolapsed ovaries, stimulates uterus and raises ovaries. |
| | 11 | Enlarges spleen, liver, stomach and intestines, dilates sigmoid and relieves spastic constipation. |
| | 12 | Depresses function of testicles, contracts caecum and raises movable kidneys. Sinusoidilization reduces prostate. |
| Lumbar | 1 | Dilates appendix. |
| | 1, 2 & 3 | Stomach reflex of contraction. Concussion contracts liver and spleen, and may induce a paroxysm of epilepsy. Decreases menorrhagia in uterine fibroids. |
| | 2 | Entro-diagnostic reaction, contracts spleen and liver. |
| | 3 | Tenderness on side of ovarian disease. In tubal disease tenderness at 3rd or lower. |
| | 4 | Tenderness in uterine disease. |
| | 5 | Contracts bladder. |
| Sacral | 1 to 5 | Tenderness in cases of diseases of bladder, rectum and anus. |

NEGATIVE REACTIONS—BUT PATIENT NOT WELL.

LEO BIGELMAN, M.D.College of Electronic Medicine,
San Francisco, California.

There probably is not a single man practicing ERA who has not more than once been faced with the problem presented by the patient whose reactions were apparently negative but whose clinical condition was unimproved. We were wont to discharge those cases with the consolation that they would improve as the system readjusted itself, that time was necessary to make manifest the results of treatment. In some instances this optimism was justified. In many, as we know to our regret, it was not; the patient continued to feel no better and we did not know why. Time has shown us, however, that there is only one answer to the problem. **The patient with negative reactions who is clinically unimproved is not negative.** This sounds like a paradox, but like all paradoxes it embodies the truth. When we say a patient is negative, we can mean no more than that **he registers a negative reaction to certain disease rates tested at that particular time under certain conditions and by a certain operator.** It says nothing about any number of possible conditions for which we did not test and for which we do not know how to test. It does not take into consideration the fact that very often a patient whom we have declared negative to certain reactions is found positive to these same reactions by someone else. We call this personal equation. **But then as long as we admit such a thing as personal equation can a patient ever be negative?** In the very nature of the thing—No.

Let us, however, assume that a number of observers working independently have found a patient negative to all possible disease reactions, there still remains the possibility that he is **not negative**, if under disease reactions we consider all conditions of disturbed endocrine function, disturbed mental and physical life, incorrect diet and high polarity quotient (see *Journal Physico-Clinical Medicine* for December-January), as well as the possibility that we do not yet know what really constitutes the basis of disease.

The question of the endocrines is of paramount importance. There is no disease without some disturbance of function of one or more of the glands of internal secretion. Very often this

abnormal activity does not return to normal after the disease activity has been checked—it may be necessary to give it a push, as it were, in the right direction. Often the proper constructive or stimulative rate on the Oscilloclast will do this. This rate must be determined specifically and treatment continued until a normal balance between all the glands is established. If this cannot be done electronically it may be necessary to resort to endocrine therapy as an adjunct. The reestablishment of a normal endocrine balance will turn many clinical failures into successes. **And whatever the modality that must be employed to do this let it be employed**—the complete relief, if possible, of the patient is our first duty as physicians. As ERA is developed, adjuncts will become less and less necessary, but let us not be ostriches and refuse to recognize any other possible modality for that case in which ERA has failed.

The patient is **not negative** if his mental and emotional life is wrong. This factor in disease is gaining more and more recognition. In many instances diseases do spring from, and are maintained, by disturbed mental and emotional states. These must be recognized, understood, and, if possible, corrected, before a satisfactory result can be expected. If that it not done, the patient is **not negative**, reactions to the contrary.

We spoke of the vitality balance or Polarity Quotient. This has been discussed in the preceding issues of this Journal. We wish to emphasize, once more, the fact that an individual with a Polarity Quotient greater than zero is not a completely well individual. Except at zero there is tension within the system, and this tension must be relieved. Again, the treatment indicated need not necessarily be electronic. It may be diet, physiotherapy, medicinal therapy, or psychotherapy, but whatever it is, it should be employed.

An individual is **not negative until all evidence of disease objective and subjective has entirely disappeared**. We are too prone to dismiss the subjective without sufficient consideration. Let us not continue in the error of telling our patients that there is nothing the matter with them when we find their reactions negative. They know and we know that there is still something the matter with them and it is up to us to find out and eliminate that something, or else admit that we cannot discover or eliminate it. Let us bear in mind that as far as reactions are concerned, all we mean when we say that an individual is negative, is that he gives

negative reactions to certain diseases under certain test conditions and by some one operator. All the personal and subjective elements are involved in this conclusion. Consequently **no individual can ever be entirely negative.** This may sound like a very destructive statement, but, in the opinion of the writer, is nevertheless true.

REVIEW OF "THE ABRAMS TREATMENT: SOME EXPERIENCES.—By Lawrence J. Bendit, M.A., M.R.C.S., L.R.C.P."

In the British Homeopathic Journal for April, 1925, Dr. Bendit published a very scholarly and comprehensive treatise on ERA. The article deserves commendable comment both because of the intrinsic value of its contents, and because of its spirit of fairness, as indicated by the fact that all deviations from the technique and instruments of Dr. Abrams, are nevertheless recognized as being only such deviations and not innovations de novo. Thus the methods and apparatus of Dr. Boyd of Glasgow are presented in this true light.

"When one has been using the Abrams method of diagnosis and treatment for some time, there begin to appear a number of generalizations as to diagnosis and cure or non-cure, in different types of cases. There also arise a number of questions on points which, if they have been noticed, have not so far been adequately explained. It should be understood that this paper does not pretend to cover the whole field of 'Electronic' medicine, as we have it already, but that it is in the nature of a commentary on personal experiences, doubtless influenced by a technique which has in it some touch of individuality, as has every technique which is not that of a hide-bound and rule-of-thumb system.

"My aim is not to praise or to decry the work of any worker or set of workers, but rather to give some idea of the work, its possibilities and limitations. For, unlike the over-enthusiastic writers who claim that nothing is impossible for the Oscilloclast, the scientifically-minded worker finds that, amazing and unexpected as are the results obtained, there are certain cases which the 'ERA' will not touch, or which it will only improve to a limited extent.

"The conception of the animal body as an electrical machine is one which is gaining ground. By this I mean that it is coming

to be recognized that the functions of the body are governed by impulses of an electrical nature. The latter term I prefer to that of 'electrical impulses,' because it is not yet proved absolutely that the impulses are actually electric, although it is certain that, if they are not, they are of a nature as much allied to electricity as is the magnetism about a piece of lodestone, i. e., that one is capable of reducing the other under certain conditions.

"It was for Abrams to discover that a comparatively simple entity, such as a microbe or a tissue cell (as well as chemical substances), produced either directly or else through the medium of something closely related to it, such as a secretion or excretion, an 'emanation,' which he called 'electronic,' comparing it with the definitely electronic B-rays of radium. There is no evidence whatever that there is any similarity between the B-rays and this emanation, and the use of the term 'electronic' cannot be said to be in any way justified.

"However that may be, this 'emanation' was found to be specific and able to be 'tuned' by certain electrical apparatus, and identified through the medium of a human subject. It is assumed that the technique of diagnosis has now become sufficiently familiar not to require a full description. **It suffices to say that the basic technique of Boyd is adopted from that of Abrams** (although the apparatus used is not the same, and the results are interpreted somewhat differently by Boyd). I personally am inclined to think that the Boyd emanometer is an instrument more delicate and efficient than are the rheostats of Abrams. That is to say, that if rheostats are used, different settings of these are required for, say, streptococci and tubercle bacilli.

"Abrams then proceeded to use an electrical machine to dissipate the reactions obtained by the effect of the various 'emanations' on the body of the subject. The method of working of this machine is as yet not clear. It is certain, however, that the treatment is partly based on giving the patient what amounts to an electrostatic charge of a certain potential. But it is also believed that there is some form of radiation from this treatment machine, or 'Oscilloclast.' The matter is still under investigation. In any case the machine fulfills its purpose, as is amply proved by the clinical results obtained.

"It is interesting to note that Abrams was the first to prove otherwise than by clinical means the efficiency of potentized drugs. For, while he originally set out to show the fraud of

homeopathy, he discovered that potentizing increased the strength of the reactions given by drugs. He was also the first to discover what has since come to be known as the 'Boyd Interference Test,' owing to the great work done by Dr. Boyd on these lines. Records of this experiment are to be found in Abrams' writings.

* * * * *

"It should not be assumed that, because a certain reaction is given by a specific organism, the presence of that reaction necessarily means that that special organism is the cause of it; thus streptococci give a reaction when the diagnostic rheostat is set at Fig. 60. But the presence of a reaction at this setting indicates, not necessarily the presence of streptococci (in the case of an unknown specimen), but of some organism the emanation of which is of the same wave-length as that of the streptococcus. What is, however, certain is that the treatment rate is the same as that for streptococcus.

"In view of this, therefore, it is better for a physician not to talk of the presence of reactions of streptococcus, or tubercle, but of reactions at '60,' or at '42', which do not commit him, but which give him indications for treatment.

* * * * *

"The Abrams diagnosis and treatment appear, in the light of clinical experience, to call for a revision of the use of the terms 'disease' and 'symptom.' For it would appear that the basis of disease conditions lies in 'infection,' or 'intoxication', or whatever term we choose to apply to the factors which give us our disease reactions. The named diseases (Bright's, diabetes, meningitis, etc.) being but in the nature of a symptom localizing the infection. It further comes out that the removal of these infections produces relief of symptoms, whatever these may be, though subject to certain limitations which I discuss below.

"The importance of treating cases according to the findings made from the blood, however ridiculous they may seem, is emphasized by a case of arthritis of one hip-joint. The physician in that case obtained a reaction at '50' from the joint. He thought he must be mistaken, and treated the joint for some time with the Oscilloclast at '2' (the rate for '60' or streptococcus). There was no change in the pain. Finally without saying any-

thing to the patient, he changed the treatment rate to '6' (that corresponding to the '50' reaction). The result was immediate improvement which could not have been due to suggestion.

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"No paper on the Abrams method is complete without some comments on the Oscilloclast, which is the 'magic box' of certain newspapers.

"The name is a bad one, for two reasons. Firstly, it is a compound of two words, the one Greek, the other Latin. Secondly, there is no evidence that, even though all matter be, in a sense, vibration, disease is due to the presence of wrong or disharmonious vibrations, any more than that it is due to the absence of vibrations, the effect of the Oscilloclast being therefore constructive, and not destructive.

"The question is often asked, 'What does the machine do?' If the reply is given that it cures the patient, the 'electronists' are not infrequently dubbed ignorant and unscientific.

"It must be frankly admitted that the exact action of the Oscilloclast is as yet uncertain. Various scientists have reported on it, but no two agree. One declares that no electricity whatever comes from it; that it is a contraption such as a child 12 might make in order to mystify a child of 10. Another declares for an electro-magnetic wave. A third for purely static effects, due to charging the patient up to a certain voltage on one pole of the mains. Yet others have declared that a simple wireless wave comes from it, some giving its length at about 1 metre, some at 7, some at about 300. It would appear from this that the child of 12 must have been one of the infant prodigies of whom we read in America, setting out to mystify not a younger child, but adult scientists rather less prodigious.

"The Oscilloclast was designed, at the request of Abrams, by an engineer of the name of Hoffman, in order to abolish the diagnostic reactions—the theory being that if the reactions were neutralized in the subject, the disease might well be neutralized in the patient. That the machine produces such an effect is now beyond dispute.

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"In these pages I find that I have given an impression of perpetual successes with every type of case the cause of whose disease lay in intoxication. It is true that the proportion of successes, especially when compared with the results of ordinary

medicine, is very large indeed, and enough to convince any open-minded sceptic. I must own, myself, to having felt very sceptical when first I came into contact with the method. But there are failures. Now, when a system shows its possibilities in so many ways, it is but natural that one should wish to account for these failures in some way. Sometimes the case is obvious, as I have indicated. At others it is less so. In any case, the science of 'electronic' medicine is in its infancy. It is my belief that no one curative system will ever be of itself entirely sufficient. Clearly, osteopathy and surgery must find their place, as must psychological methods, together with rules of general hygiene and dietetics. Certainly, as we can see things at present, much disease is due to infection, on the one hand, and lowered resistance on the other. It would appear as though in combating these, homeopathy and Abrams method would work well in harmony, in that the one treats the patient while the other destroys the infections, and that the one will supplement the other in many of those refractory cases which will not respond to one system alone. Thus the two together will cover the whole field of diseases which do not involve either definite surgical or definite psychological treatment, and perhaps even a number of those which may improve reflexly from the body made healthy in other respects.

"I have said little of the work of Dr. Boyd, for the simple reason that he is himself far the most capable person to speak of it; and also because I believe that his researches have led him on to a somewhat different line from that of Abrams, although they started from the same point, being based on the ideas of Abrams. Of the wonderful new field for work and research there can be no doubt, and I believe that the future holds much in store of new knowledge of the human constitution, of the mysterious workings thereof, and of the aberrations from the normal which constitute disease."

NOTES FROM THE EARLY WORK AND WRITINGS OF DR. ALBERT ABRAMS.

The following quotations are excerpts from the earlier work and writings of Dr. Abrams, and are reprinted first, because they are all of vital interest, and secondly, because they anticipated the theories and statements of many, who are today promulgating certain findings as exclusively their own, but which Dr. Abrams stated many years ago.

"THE PHYSICS OF HUMAN PHENOMENA."

"Scientific theories are frequently swept into the discard. The physics of the electron has dethroned cherished hypotheses which, in deference to tradition have survived the lapse of time.

"Electron Theory.—Electrons are charges of electricity which produce radiations by their incessant activity. The relatively crude methods of physicists show that, practically only thirty-six bodies (products of uranium, thorium or both) are radioactive.

"Radium emanation is detectable by the electroscope which is a million times more sensitive than a spectroscope although the latter detects the millionth of a milligram of matter.

"Electroradiometer.—This apparatus devised by the writer is essentially an electroscope sensitized by its construction on the electric balance. Observations with it are objective, constant and invariable and disprove the contention that the normal condition of matter yields no evidence of electricity. On the contrary, radiant energy from all matter is electric and that by certain devices in connection with the instrument, differentiation of one substance from another is possible and furthermore, the energy yield of matter and polarity are determinable."

* * * * *

"Animal Machine.—Problems of nature are only computable in accordance with the laws of physical science. The forces resident in the living organism correspond with those governing the inanimate world. The ultimate unit of the human organism is the Electron and not the cell and the phenomena associated with the former may be interpreted with mathematic certainty by the Electroradiometer. Vital phenomena are dynamic and the actions of organisms should be regarded as processes and not as structures. Science today though true is woefully deficient.

"A science may be gauged by the amount of mathematics (symbolized logic) it contains and when one can neither measure nor express knowledge in numbers, such knowledge cannot be dignified as scientific. The writer is a positivist in the sense that knowledge should be limited to phenomena and that all sciences are but branches of one science to be investigated on one and the same method. The ancient theory of vitalism predicted a capricious vital force unfettered by natural laws, thus segregating the human organism from other entities which retarded the interpretation of human phenomena. The lungs of the human machine

antedated the bellows; the heart, the pump; the hand, the lever; and the eye, the photographic camera.

"Telephonic and telegraphic apparatus only duplicate what has always been done by the nervous system and always by aid of the same energy and the sense organs are equipped as receivers for all kinds of radiant energy.

"Human Radiation.—Energy liberated by the human appears in mechanical, thermal and electrical form. Apparatus (magnetometer, sthenometer and a variety of dynamoscopes) for recognizing radiations have been devised but lacking constancy in action, they are impracticable.

"The heretofore supposititious radiations have been called prana, animal and vital magnetism, odyle, psychode, biactinism, aura, etc. Superstition is true psychology with the wrong dress and the Electroradiometer shows that some spiritistic phenomena are realities independent of disembodied spirits and referable to the manifestations of human radioactivity. It can be shown that, in the normal male, radiations from the right hand are positive and negative from the left hand and this polarity is reversed in the normal female. Yellow reflected on the body will reverse the normal polarity in both sexes. It can be shown with the Electroradiometer that the average man thinks with only one side of his brain, whereas the genius utilizes both sides."

"PHOTOGRAPHY OF HUMAN RADIOACTIVITY."

"Radioactivity is recognized in three ways: effects on a photographic plate, fluorescence and ionization of the air.

"That distinguished authority, Dr. Hereward Carrington, avers that the majority of 'spirit photographs' are easily 'faked' and serious psychic students are now avoiding photographs from professional mediums.

"He contends, however, that there are authentic instances of 'thought photography'; a plate or film is placed on the forehead of the subject who endeavors by intense effort to impress upon the sealed plate a mental picture or image held in the mind.

"The writer has endeavored to secure photographic impressions by an entirely new method with fairly constant results. The impressions are at present imperfect (Fig. 12), but continued experiments may yield better results.

"Experiments were conducted with objects of steel. If, for instance, a steel key or ring is placed in the center of the forehead, its form may be reproduced on the abdomen at a point above and to the left of the navel by percussion (dullness) or

the Electroradiometer. The latter detects radioactive rays. If at the reproduced area a sealed film (dental) is fixed by plaster with the steel object applied to the center of the forehead by plaster and the subject retires for the night, one may obtain photographs of the object like those shown in Fig. 12. It has been found that many of the experimental photographs reproduce the hairs of the abdomen and this suggested the thought that a card on which hairs were placed and fixed there by collusion would aid in reproduction (card between abdominal skin and film). This proved to be the case. The writer is now experimenting with different substances applied to the outside of the film to determine the active actinic rays and prevent their diffusion through the film."

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"THERAPEUTICS OF COLOR—(Chromotherapy).—Color is one of the greatest contributions of nature to man. This is true not only in the aesthetic but in an utilitarian sense. Elsewhere (N C), I have expatiated on this subject.

"The fly abhors blue, and this color may be used with advantage in the elimination of the house fly as a disseminator of disease. The anopheles mosquito eschews yellow. The ERA show that blue dissipates the reaction of syphilis, cancer and strep infection and yellow, tuberculosis.

"In homeopathic practice, yellow iodid of mercury is used for tonsilitis on the right side and red iodid of mercury for a like effect on the left side.

"Recent investigations in my laboratory show that these facts are easily verified. If when a normal male is facing west and red light is filtered on the left side of the head, the pulse volume of the left pulse is increased. If yellow is used, the volume is decreased.

"Opposite effects are noted with the right pulse by these maneuvers.

"These effects are reversed in the normal female. Explanation of the foregoing may be found in N. C., p. 237."

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"TOXINS AND BACTERIA.—There is necessarily a disparity in the findings of one who uses the ERA and the microscope in the detection of disease.

"Thus, a culture tube of dead tubercle bacilli will still give a reaction by the ERA, owing to the presence of toxins elaborated

from bacterial growth and on which the disease producing power of bacteria is dependent.

"Thus it is that many tuberculous lesions are unrecognized because bacilli are not found. This is also true of tissues, and early disease is beyond the ken of the pathologist who regards vital phenomena as structures in lieu of dynamic processes.

"Physiological fluctuations invariably precede a pathologic-anatomic substratum.

"Thus, the microscopist who finds bacilli in the sputum and the radiographer with his findings only establish late diagnoses.

"Recently a physician consulted the writer for priapism of twenty years' duration. The ERA demonstrated tuberculosis of the tenth and eleventh dorsal vertebrae. The Oscilloclast (at 5) after a few treatments subdued the condition. The writer constantly sees persistent skin affections which are tuberculosis, and yield readily to the tuberculous and syphilis rates of the Os. (All tuberculous lesions are grafted on persistent foci of congenital syphilis).

"Many chronic nasal discharges are dependent on tuberculosis of the nasal mucosa grafted on a congenital syphilis basis, and yield to the Oscilloclast at the TB rate (5), followed later by the syphilitic rate (3). * * * * *

"PARASITISM.—We have endeavored to show that bacteria are not the cause, but the by-products, of disease.

"The vulture is only in evidence in the presence of carrion, and the latter represents an advanced stage of putrefaction.

"There are intermediate grades of death, and lowered vitality, represented by disease, is one of them.

"These foci of diminished vitality, like the garbage can, invite bacterial invasion, and should be called vulturine lesions.

"The nature of a COLD is unknown. If the skin is cooled at a definite point with an atomizer and an ERA is at once taken, a streptococci reaction can be demonstrated.

"If unfamiliar with the ERA, look for the picture of the strep. reaction (see following subject). An irritated skin will also give a strep. reaction. Thus, a cutireaction (Von Pirquet) is valueless; the resulting dermatitis is as much the result of the number of streptococci attracted as it is of the tuberculin used. The nearest approach to an understanding of Herpes is, that it is ganglionitis. The ERA shows a strep. reaction over the ganglia, and the post zonal neuralgia may be treated with the Os. at 2 over the implicated ganglia."

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"ORIGIN OF MAN.—The idea of 'special creation' for man is unsupported by facts, and it is reasonable to assume his descent from a humbler organism. The structure and functions of man are not demonstrably different in kind from those of the nearest Primates (monkey). By the methods of the writer, it is possible by the vibratory rate of blood, to differentiate human from animal blood, excepting the monkey. **THE BLOOD OF THE MONKEY HAS THE SAME VIBRATORY RATE AS THE BLOOD OF THE HUMAN.**

"RENAISSANCE OF SENESCENCE.—A man may be only as old as his arteries, but in an utilitarian sense he is as old as his sexual apparatus. With vigor of the latter, although vascular degeneration coexists, no man can be regarded as old, and he is without the domain of geniatics. The quest for the 'fountain of youth' has recently been sought in that caprine ruminant, the goat, whose transplanted testes are destined to restore sexual vigor.

"One of the most prominent advocates of this method recently visited my laboratory, and his sincerity could not be questioned. He related how tortuous arteries by this method were restored to normal after transplanting the testes of goats. In investigating this action, the writer found that the radioactivity of the normal testes was destructive to the formation of connective tissue which is associated with senescence. He found furthermore that many instances of premature impotency were due to the presence in the testes of colon bacilli, thus justifying the autointoxication theory of Metchnikoff, that ageing was caused by the absorbed toxic products of intestinal decomposition. In lieu of transplantation, it is suggested to destroy the bacilli by the Oscillo-clast or by gamboge painted over the scrotum.

"My reactions show that the testes of the goat often yield the reactions of tuberculosis, and that the animal in question is not immune, as it is supposed to be, to this disease."

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"THE CANCER PROBLEM."

"Until the 'Electrical Nature of Man' is recognized, the cancer problem is remote from solution. Much imagination has been exploited in theories which have failed to survive the lapse of time.

"In the prodigious literature anent cancer only two conspicuous facts can be extracted:

- "1. An exciting cause specified as irritation;
- "2. An unrestricted growth of cells.

"The cell is not the ultimate constituent of the organism; it is the electron.

"The electronic conception of cancer is the only rational one and this rationality is emphasized by the results of treatment based on this conception.

"The units of cells are charges of electricity known as electrons. What we call cancer is only a matter of positive and negative electrons plus ether. The differentiation of matter is only a question of arrangement of the electrons. It is by aid of this allotropy that one substance is distinguished from another substance. The electrons of a normal cell are electrically balanced, that is, they are isoelectric spheres of positively and negatively electrified corpuscles.

"It can be shown by the 'Electronic Reactions of Abrams' and by aid of the writer's Oscillophore that tissues in the norm yield a neutral energy, but if these tissues are irritated, they become positively charged owing to the escape of negative electrons.

"The disturbed placidity of the electrified corpuscles has invited chaos and the riot ensuing among the positive electrons suggests the unrestricted growth of cells or cells gone mad. A cancer, then, is an insane revelry of electrons and the actuating factor of this biophysical orgy is irritation.

"What is the source of this irritation?

"Until the advent of the electronic reactions, medical practice was dominated by the cellular theory and a solution to the problems of pathology was sought by aid of the microscope. Vital phenomena are dynamic and the actions of organisms should be regarded as processes and not as structures.

"The misdirected researcher saw with his microscope only the carnage wrought by the intericine battle of the electrons. He saw nought of the causes leading to the battle, hence the cancer at its inception was beyond his ken.

"It is for this reason that the study of processes and not structures must supersede the interpretation of pathological phenomena.

"It is necessary to destroy the chaos on which present day pathology is founded to make it useful in the service of the physician.

"Recent investigations with the electronic reactions show that the soil in the human on which every cancer develops is a persistent focal lesion of congenital syphilis. This is a source of irri-

tation. Without this focus, cancer would be relegated to desuetude. We are all congenitally syphilitic in various degrees of dilution.

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"The Utopia of medical practice will be achieved when pathology will be recognized as a mere annex of syphilography.

"One must not for a moment believe that human pathology is specific. The laws of nature are universal and are not abrogated in favor of one creation.

"I have shown that there are cancers of plants. That certain kinds of moulds developing in fruits are veritable cancers. That iron rust, in a chemic sense, may be an iron oxide, but in biophysical sense it is a cancer. That the mould on cheese is tuberculous."

THE SPLEEN A GERM-KILLER.

The following excerpt from the Literary Digest for May 15, 1926, is of especial interest to all ERA workers. Dr. Abrams was probably the first man to throw any very definite light upon the function of the spleen. His employment of the splenic reflex of dilatation in the treatment of various conditions, especially syphilis receives corroboration in these findings from other sources. Corroborative evidence of the work of Dr. Abrams is to be found in nearly all of the newer and more advanced work in the fields allied to medicine and in the general sciences.

"Modern medical science is at last unraveling that physiological mystery of the ages, the purpose of the spleen in the human system. It has been known since classical times, says Science Service's Daily Science News Bulletin (Washington), that the spleen could be removed without any apparent ill-effects on the patient. Various conjectures as to its purpose in the human anatomy, all more or less erroneous, have come down to us. By the last half of the nineteenth century it was definitely established that it had something to do with the purification of the blood as well as the formation of some of the blood cells, and tho it was not necessary for life, these functions after removal were taken over by the bone marrow and other organs. To quote:

"In a resume of the more recent work done on this mysterious organ, by Dr. E. B. Krumbhaar of Philadelphia, we find that the spleen is an important source of anti-bodies, those little-understood elements in the blood that help kill off bacteria. Labora-

tory experiments seem to show that the spleen plays a considerable part in resistance to such infections as tuberculosis and also to the growth of tumors. It has been found that tumor grafts make much less growth in the spleen than in any other organ, and that its removal definitely cuts down the resistance to tumor inoculation. Some experimenters believe that it contains a substance actually destructive to tumor cells, but this has not yet been conclusively proved. Two doctors of New York City, Dr. S. Shapiro and Dr. F. H. Frankel, have tried to ascertain the effects of feeding extracts of spleen and bone marrow upon the formation of red corpuscles. Their patients showed an increase in the number of red cells while being fed the extract, but the count went down as soon as the dose was stopt. The definite establishment of the fact that such extracts contain a substance which will increase the production of red corpuscles would be of inestimable value in the treatment of many diseases, particularly anemia."

DO YOU KNOW?

DO YOU KNOW—

That a German scientist claims that cancer may be detected by blood test? Of course this comes as a surprise to the ERA World.

"LONDON, March 28.—Detection of cancer by blood tests is claimed by a German scientist whose identity is not disclosed.

"Dr. H. M. Mitchell, senior honorary surgeon of the Liverpool Cancer Hospital, who made the announcement said he was not at liberty to divulge the German's name, but he had made a cleverly devised apparatus by means of which he could examine a few drops of the patient's blood and detect cancer in its early stages in any organ of the body.

"In addition, said Dr. Mitchell, the German scientist can, by examining a patient's blood six months after an operation, tell whether the operation has proved successful in removing all traces of cancer from the affected parts.

"The German, under whom I have studied, has been working on the problem four or five years, and has evolved an entirely novel method. His apparatus is quite original and is off the lines of any previous research. It consists of instruments for measuring blood reactions spectroscopically.

"I have seen this method privately demonstrated in Liverpool.

Not only can the scientist tell the presence of those abnormal conditions which are looked upon as the forerunners of cancer, but he has also demonstrated frequently that he can actually tell the precise organ."

* * * * *

That two American Physicians also claim the Diagnosis of Cancer by Electrical Means? In the reprint from the Associated Press of April 2, note the bold type, you will observe a superficial analogy to ERA.

"Before the meeting of the American Association for Cancer Research which met here yesterday, Dr. Stern Morse of Cleveland described how he and Dr. Hugo Fricke had diagnosed cancer growths by the use of an electrical device in which was a section of tissue removed from the growth. The resistance produced in an electrical circuit by this growth measured its malignancy.

"If the resistance developed was high, the growth was shown to be rapid growing and malignant. If it was low the growth was not malignant. The resistance in each age group differed, however, being higher in young people than in old."

* * * * *

That Diet Experiments Have Shown a Relationship Between the Quantity of Food and the Duration of Life of a Cancerous Organism?

"Dr. K. Sugiura of the Memorial Hospital, New York, told of experiments in underfeeding cancerous rats. His experiments, he said, showed that underfed rats that had been operated upon for cancer lived about thirty-five days longer than fully fed rats. This corresponded to about three years in the life of a human cancer patient, he said, and **indicated that underfeeding might prolong the lives of those who had been operated upon for Cancer."**

If there is anything to the toxine theory of cancer, it becomes self-evident that excess food, and for that matter certain foods as we pointed out in an article some time ago, must add to the systemic toxemia, and thus stimulate cancerous development and recurrence. The whole situation may be summed up in the statement, that **what you don't feed a patient won't kill him; what you do may.**

* * * * *

That an English Rector has invented an adjunct to Electronic diagnosis? The reprint is self-explanatory:

"The Rev. B. J. Corder, rector of Dadnage, High Wycombe, England, has invented a machine to carry out more efficiently the 'percussion' of the abdominal walls which was a leading feature in the methods of diagnosis of the late Dr. Albert Abrams, of San Francisco, the inventor of the 'Abrams Box.'

"Sir James Barr, it will be remembered, declared that Abrams was one of the only two medical geniuses of the last 50 years, and defended the Abrams methods of diagnosis and treatment vigorously. A committee of six medical men, headed by Sir Thomas Horder, who investigated the box, said that 'in view of the urgent need of an answer to the question, "Does anything happen?"' they are satisfied for the moment with being able to say, in effect, 'Something does happen.'"

Rectory Workshop.

"The Rector of Radnage, who is a well known inventor, with his own apparatus and workshop at the rectory, some 12 years ago invented an apparatus with which he could detect the electrical emanations from the human body. He is now convinced that Sir James Barr's opinion of the Abrams Box is correct.

"The weakness of the Abrams methods, however, is his percussion or tapping on the human body. Mr. Corder has invented a sensitive instrument which he says will detect the electrical frequency of the human.

Accuracy in Diagnosis.

"The principle of it, he says, is a rectifying crystal in conjunction with a very sensitive capillary electrode. It yet remains, adds Mr. Corder, to ascertain the definite wave-length between the normal and abnormal condition of the human body and the application of this process to the various diseases.

"Mr. Corder believes that this instrument eliminates the uncertain element from the Abrams methods and opens the way to greater accuracy in the diagnosis of diseases."

* * * * *

That plants have organs that correspond in action and function to the heart of an animal?

A Plant's Heart-Beat.

"Plants have organs that correspond in action and function to the heart of an animal. This is the latest of a remarkable series of discoveries made by Sir Jagadis Chandra Bose, the Indian scientist, at Calcutta, as described in the New York Times. We read:

“Thirty-two years ago he began his researches. He found that inorganic substances exhibited fatigue similar to the fatigue of animal muscles, and that the fatigue in both was removed after a period of rest. This led him to investigate the characteristics of the simpler forms of life, as shown by plants.

“After long researches he was able to prove what he was convinced of before—that the life mechanism of the plant is identical with that of the animal. He discovered how many plants may be shown to respond to stimuli, and arrived at the following conclusions, which he demonstrated on the eighth birthday of the institute in Calcutta which bears his name:

“The plant possesses a highly differentiated nervous system, which can be proved by throbbing pulsations, which take the place of the heart-beat of the animal, and which show violent spasm exhibited at the crisis of death. By his optical lever he was able to demonstrate the activity of the cells of the plant in the propulsion of sap from the roots of the tree to the topmost leaves, thus solving a problem that had baffled inquiry for 200 years. The location of the heart of the plant was made by means of an electric probe in circuit with a sensitive galvanometer.

“Bose introduced the probe step by step across the stem; as soon as it came into contact with the pulsating layer, an electric response was received and recorded by the galvanometer. Each active cell absorbs water from below, and expels it upward.

“To measure the heart-beat of the plant, which is less than a millionth of an inch, it was necessary for it to be enormously magnified, which is done by Bose’s magnetic amplifier. A mirror is attached to the astatic magnetic system, the reflected beam being thrown on a screen or photographed on a film. All this Bose performed before his audience, which was able to see how chloroform, for instance, at first immensely excited the plant, stimulating it to great vigor. Then came the death spasm. Rapidly and spasmodically the beam of light fell until it came to rest, indicating that the plant had died.”

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"The motive of this Journal is to replace the cell doctrine by the Electron theory. Vital phenomena are dynamic and the actions of organisms should be regarded as processes and not structures. Exclusivism is excluded inasmuch as all sciences are embraced in practical medicine and diagnosis must invoke physical, biological, and chemical methods. All problems in medicine not in accord with the progress made in physical science are doomed to perish."
—Dr. Albert Abrams.

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