time to come. In order, therefore, that others who are interested in the study of free-living nematodes may pursue the matter further, this preliminary note is published in its present incomplete state.

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SPECIAL ARTICLES

ELECTRIC CONDUCTIVITY OF RED BLOOD CORPUSCLES USING HIGH FREQUENCY ALTERNATING CURRENTS[1]

Rudolph Hoeber determined the electric conductivity of suspensions of erythrocytes in isotonic sugar solutions by various substitution methods. He used damped alternating currents of radio frequency for the high frequency currents. Owing to the fact that high frequency apparatus has been very much improved, and it is now possible to obtain undamped alternating currents of any desired frequency, it seemed desirable to make some new determinations. During the past nine months I have spent much time in the attempt to observe a difference, if any exists, between the conductivity of erythrocytes as measured by continuous currents in contrast to that measured at about one thousand cycles per second. It was found that calomel electrodes of large size showed so little polarization during the passage of a small current for fifteen seconds that these could be used for running the current into and out of the erythrocytes. Apparatus was made which reversed the current every fifteen seconds and the final reading was verified during one fifteenth-second interval. The electrode vessels were separated from the erythrocytes by means of agar gel made up with saturated potassium chloride solution. After many methods were tried, a Wheatstone bridge method was finally used. No difference in conductivity with direct current and with a thousand cycles could be established with certainty. Attempts were next made to detect a difference between the conductivity at one thousand and one million cycles. The current of a thousand cycles was generated by a Vreeland oscillator and gave a pure sign wave as shown by the oscillogram. A million cycle current was produced by an electron tube oscillator. This frequency is too great to be studied by the oscillogram, but it is a general opinion of radio engineers that such currents show harmonics. No better source of current, however, was known at this frequency. Measurements made with a bridge whose known resistances were wound according to the Ayrton-Perry winding were very unsatisfactory at a million cycles, although this bridge gave very good results at fifty thousand cycles. Therefore, a very simple and symmetrical bridge was constructed in which the metallic resistances were straight wires and the detector was a crystal detector and sensitive galvanometer. No theoretical defect in this bridge was known, and since no more suitable arrangement has yet been used, the results are taken to be provisionally correct. It was found that the specific conductivity of a sediment of ox-erythrocytes containing a small percentage of serum was 0.001 reciprocal ohms at one thousand cycles per second, and was 0.0014 reciprocal ohms at a million cycles per second.

Hugo Fricke has made some measurements of the capacity reactance of living cells. In order to interpret his data as capacity reactance, certain assumptions had to be made. If it is really true that the conductivity is greater at high frequency and that the cells show capacity reactance, a simple and time-honored picture of a cell which would show these phenomena is one in which the cell interior is a moderately good conductor of electricity but the cell surface acts as a dielectric and insulator. When a direct (continuous) current is passed through a sediment of the cells, the current passes through the film of medium separating the cells and does not pass through the cells themselves to any large extent but when a high frequency alternating current is passed, it passes through the medium as well as before and in addition to that it passes directly through the cells, the insulating surface of each cell acting as the dielectric of a condenser.

These preliminary measurements are published owing to the fact that the work will have to be interrupted during the summer.

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STINGING CRYSTALS IN PLANTS

Stinging crystals are widely distributed throughout the vegetable kingdom. They are in the form of raphides, composed of calcium oxalate, and their action is generally regarded as mechanical. As a matter of fact, however, the mechanical effect of such crystals is not the sole cause of the irritation, though this is a contributing factor. Calcium oxalate in the form of raphides is common particularly in the Monocotyledons, but by no means always do they have stinging properties. Some other factor must be looked for. For the purpose of this investigation the Cabo Negro palm (*Arenga pinnata* Merr.), the dumayaka (*Arenga tremula* Becc.) and the pungapung (*Amorphophallus campanulatus* Blume) were used. In the first two the crystals occur in the fruit in a layer of cells on the inner side of the endocarp;