has become known to the country people in several parts of Siam, and it is reported that sufferers from the disease are now using them with success, without any medical attention or advice. It is even stated that in several districts where diabetes is common the people are employing the fruits as a preventive! In the markets of Bangkok and other communities these fruits are now regularly exposed for sale as food by the small vendors of miscellaneous forest and jungle produce, and enough for five days' treatment may usually be obtained for the equivalent of five cents in United States money.

In the absence of full physiological and clinical data, it would be unwise to set up large claims regarding the therapeutic value of the plants in question, but from the information at hand it would appear that in these plants we have available a cheap, easily administered substance which has a noteworthy palliative influence on the sugar content of the urine in diabetes and may act like insulin. There is, furthermore, some evidence that under special conditions the effects may be regarded as curative.

It is believed that the known facts are so suggestive as to warrant a thorough investigation, and it is hoped that some workers or institutions in America or elsewhere may feel disposed to conduct a convincing test. Supplies of the fruits may undoubtedly be obtained through various agencies in Siam, such as the American Consulate, the Botanical Department of the Ministry of Commerce, and the Department of Public Health of the Ministry of the Interior, all in Bangkok. The plants are so hardy that they could probably be grown from seeds in subtropical parts of the United States, or in hot-houses anywhere.

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E.M.F. INDUCED IN A STRAIGHT WIRE BY A CURRENT IN A PARALLEL STRAIGHT CONDUCTOR

THE seeming paradox described by Professor Karapetoff, in the article under the above title, in SCIENCE of November 18, arises in its faulty premises.

The conception of current in a long straight conductor with open ends is not permissible. It would require an infinite electromotive force to set up such a current, but more important for the discussion, assuming the presence of the current, a finite change in its value is impossible, for such change would be accompanied by self-induced e.m.f. of infinite value, which is absurd. A long straight current-carrying conductor therefore must be part of a closed circuit. In such case, the central conductor must either be closed also, or stuck through holes in the outer conductor, or be of shorter length, terminating inside the outer conductor. In any one of these cases e.m.f. will be induced. In the last case of the open wire, the e.m.f. could not be measured; first, because the necessary instrument could not be connected, and second, because the e.m.f. would be too small to measure, the greater part of the total induced e.m.f. being consumed in the dielectric circuit closing the two ends of the wire.

The reasoning in the second case leads to the correct conclusion as regards such long straight conductors as arise in experience, but by means of unfortunate, and, I believe, unwarranted premises. Induced electromotive forces in both experiment and theory arise only from changes in the interlinkages of electric and magnetic circuits. The experimental fact needs no comment as clearly set forth by Professor Karapetoff. The theoretical origin of induced e.m.f. arises from the energy associated in the combination of a magnetic shell, or an electric circuit, with an external magnetic field, any change therein being reflected as an induced e.m.f. in the circuit, as shown in Neumann's expression. There is thus no warrant for the use of the idea of collapsing lines of force, or a conductor's cutting lines of force, except in so far as these offer convenient ways of computing changes in the total flux interlinking the electric circuit, which perhaps is only another way of expressing the conclusion reached by Prof. Karapetoff in his final paragraph.

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IN a recent number of SCIENCE Professor Karapetoff proposes the problem of finding the induced electromotive force in a straight wire due to variation of the current in a surrounding coaxial hollow cylinder. He presents two lines of argument which lead to different results, but recognizes that both methods of reasoning are open to objection, in that they are based on Faraday's circuital relation which is valid only for a closed circuit. His inference that it is not legitimate to speak of an electromotive force in a single straight wire does not, however, carry conviction to the present writer. For suppose the long hollow cylinder to be charged initially, positively at the upper end and negatively at the lower end. These charges, oscillating up and down, constitute a varying current, and if there is an axial electric intensity an oscillatory current will be induced in the central wire, whose presence can be detected by the heating produced without the necessity of attaching voltmeter leads to the ends of the wire.

The induced electromotive force in a secondary circuit fixed relative to the observer's inertial frame produced by a varying current in a fixed primary is due to the portion of the electric field of the charges constituting the current which depends upon their acceleration. In the case of the open circuit under discussion the electromotive force along the central wire can not be calculated in any simple manner from Faraday's law, but it can be obtained at once from the series for the simultaneous electric field of a point charge given on page 40 of the writer's "Introduction to Electrodynamics." The necessary integration can be carried out without difficulty if we assume that the inner wire has a length small compared to that of the outer cylinder and is placed at the center of the latter. In this case the electric intensity along the axis is found to be

$$E = -\left\{\log \frac{1+\cos\vartheta}{1-\cos\vartheta} - \cos\vartheta\right\}\frac{di}{dt}$$

where both E and i are expressed in electromagnetic units and ϑ is half the angle subtended at the center of the tube by a diameter at either end. The current has been assumed to be uniform along the length of the tube, which would not be the case in the illustration previously mentioned. The electromotive force along the inner wire is obtained by multiplying this expression by the length of the wire. As the length of the outer conductor is increased $\cos\vartheta$ approaches unity and E becomes great without limit.

The electromotive force is the same as if the current were concentrated in a generating line of the hollow cylinder instead of being spread over its surface. Therefore we can check the formula given above by considering the former inner conductor to be one side of a rectangular circuit lying in the plane of the two conductors just considered and extending to infinity on the side away from the generating line. If we calculate the electromotive force along the long sides of the rectangle by the method employed above we get an expression per unit width of the circuit equal to the second term in the formula above, but opposite in sign. As the electromotive force in the distant short side of the rectangle is negligible, the total electromotive force around the entire circuit is given by the first term of the formula, for a rectangle of unit width. But if we calculate the magnetic flux through the rectangle and then compute the electromotive force from Faraday's law we are led to the same expression.

LEIGH PAGE

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SIR JAGADIS CHUNDER BOSE AND HIS LATEST BOOK

THE delicacy of the political situation in India, the prominence of the Bose family, the unusual taste for biology possessed by one of its members, the strain of mysticism in the minds of all the East Indians with whom we come into contact—these factors and their sequelae have produced a singular situation in the scientific world. As a result biologists, or at least botanists, may be divided, without serum-diagnosis, as Bosephile or Bosephobe: and to have a neutral reaction is taken to indicate either a degree of ignorance or a feebleness of backbone quite deplorable.

In the first place, there is no question that Sir Jagadis Chunder Bose is the most distinguished biologist in India. The wealth of his family has secured for him freedom from economic anxiety, has built and supported for him the Bose Institute in Calcutta, where, under his directorship, the study of reactions to stimuli in the living and the lifeless is carried on in accordance with his tastes and methods.

Bose's recent book, "Plant Autographs and their Revelations," is the address of an enthusiast to an audience conscious of ignorance and desirous of enlightenment. From its dedication to his wife, "who has stood by me in all my struggles," to the last paragraph, "Not in matter but in thought, not in possession nor even in attainments, but in ideals, is to be found the seat of immortality," one sees the idealist, the mystic, dealing with facts too few in number, too incompletely understood, too imperfectly apprehended in their relations, quite too inaccurately measured and recorded, to justify conclusions put forward as knowledge. The conclusions are interesting, suggestive though not new, and are entirely legitimate if correctly labeled: but they are not science, they are not knowledge; they are belief, they are a philosophy of life, a guide and interpretation of conduct.

The trouble with Bose, as I see it with my occidental eyes and my American mind, is that while his curiosity is directed to biological phenomena, his mind is inadequately equipped with the information and the habits necessary for accurate study, and his reflections are addressed to philosophical problems. He is practical minded to the extent of using self-recording apparatus in his laboratory and social institutions in his human relations, but his ambitions exceed his capacities, his critical faculties are not applied to his methods and their results, his vocabulary outruns his findings. This may be illustrated by a quotation, typical of the whole book in spirit and defects: pp. 183–185. "Autographic Record of Assimilation:" "Water plants obtain their carbon from the carbonic acid dissolved in water. When sunlight falls upon these plants, carbonic gas is broken up, the carbon becomes fixed in the form of organic compounds known as carbohydrates, and an equal volume of oxygen is evolved which rises as a stream of bubbles from