feed to insure its complete consumption. Within twelve days a marked improvement was noted in these seven pigs. A return of appetite was apparent and increased physical activity was displayed, the pigs searching for food and having every indication of return to normal health. The dermatitis disappeared from the ears where new hair began to grow and the scurf on the back was lifted by the growth of the new hair.

Nicotinic acid was then given to the entire herd in 50 mg daily amounts mixed in the feed, and complete recovery was made by all the pigs as noted with the previous seven. The dramatic response to nicotinic acid treatment is similar to that described by Chick. The feeding of nicotinic acid was continued for two weeks. As pasture was not available ground alfalfa and cod liver oil were then included in the ration.

Within six weeks the entire herd had completely recovered, growth having been resumed and the entire lot of pigs appearing to be normal.

This is believed to be the first time that a nutritional disorder simulating swine pellagra has been reported as occurring under conditions of agricultural practice. The effectiveness of the administration of nicotinic acid in alleviating the condition adds further proof as to its identity. It is not believed that this condition occurs in practice to any great extent, especially as affecting entire herds as in this case. However, individual pigs are sometimes seen whose condition resembles that described above.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A PRECISION DEVICE FOR FARADIC STIMULATION[1]

MUCH of the confusion surrounding evidence on cerebral localization arrived at by stimulation may be due to lack of precise methods. As an essential first step in clarifying this situation it is felt that certain descriptive criteria should be agreed upon. Suitable criteria for faradic stimulation are: (1) intensity; (2) frequency; (3) wave form.

The expression "voltage" has little descriptive value because of the varying and indeterminable fraction of the total voltage "drop" that takes place "across" the neurological unit under stimulation. Crude tests of current strength likewise are inadequate. "The smallest current that will produce a contraction of the temporal muscle" may cause a more vigorous contraction or none shortly afterward, or in a different area.

With a stimulating device of the voltage-regulating type one can not precisely control or reproduce the current reaching a neurological unit because of the varying resistance of the subject pathway and its segments. A rational solution of this difficulty is provided by the current-regulating form of device in which relatively high voltages are applied through resistors of such large order that alterations in the subject pathway leave the preselected current level practically unchanged.

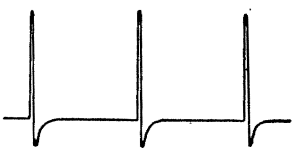

FIG. 1. Tracing of oscillograph image of wave form delivered by stimulator. Wave form constant over the range of intensities.

In 1937 Newell and the writer described a simple device of this type for faradic stimulation in which intensities were read directly on a meter. The sine wave form was used. Intensities could be selected in advance, and, of course, exactly duplicated in any succeeding experiment.[2] However, it is now felt that the sine wave probably is not as satisfactory as one in which there is a sharp rise and fall of electromotive force.

Of wave forms that satisfy this criterion and that may readily be duplicated in other laboratories, that of the condenser discharge recommends itself. Accordingly, with the engineering assistance of Dr. G. V. Nolde[3] we have devised and tested a stimulator for laboratory and clinical faradization patterned essentially after that of Schmitt and Schmitt[4] but modified by the addition of an amplifier stage and large resistance banks to make possible delivery of graded, predetermined intensities of current. The wave form is shown in Fig. 1. A frequency of 50 cycles a second is used, though an adjustment makes a variety of frequencies available.

The condenser C_1 (Fig. 2) is charged through resistor R_1 until the firing potential of thyratron 885 is reached, when discharge through T_1 overcomes the

[1] From the Department of Surgery, Stanford University School of Medicine, and the Stanford Surgical Service of the San Francisco Hospital. Financed by a grant from The Committee on Scientific Research of the American Medical Association.

[2] Frederick A. Fender and R. R. Newell, *Archives of Neurology and Psychiatry*, 38: 1289, December, 1937.

[3] The stimulator here described is very competently manufactured by the Butte Electric and Manufacturing Company, 24 Sterling Street, San Francisco.

[4] Otto H. A. Schmitt and Francis O. Schmitt, SCIENCE, n.s., 76: 328, October 7, 1932.

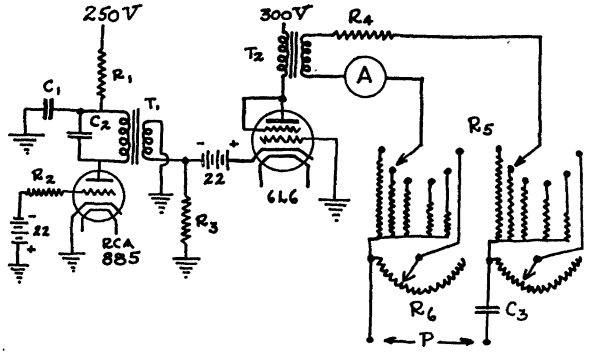

FIG. 2. Circuit. The plate supplies of the two tubes are not shown. These come from a single power pack utilizing an Inca C-65 transformer, a 5Y3 tube, two 12 henry chokes, two 4 microfarad condensers, and a 50,000 ohm resistor from which the 250-volt line is taken. The transformer heats the rectifier filament and supplies the heaters of 885 and 6L6 using a separate secondary and resistances of 3.4 and 1.38 ohms, respectively. R_1 – 50,000 ohms; R_2 – 20,000 ohms; R_3 – 5,000 ohms; R_4 – 100,000 ohms; R_5 – ganged resistors of 10 meg, 5 meg, 2 meg, 1 meg and 0.5 meg each; R_6 – two ganged zero to 500,000 ohm resistors. C_1 – 0.5 mf; C_2 – 0.02 mf; C_3 – 0.5 mf; A – zero to 200 copper-oxide rectifier type microammeter. T_1 – Thordarson 67 D 50; T_2 – Thordarson 14 A 29.

fixed negative potential impressed upon the grid of amplifier 6L6 to allow current to flow in this tube, T_2, and the output circuit. Average current is read directly on microammeter, A. Peak values are arrived at by multiplication by a constant for the unit. The stimulator has been used on patients on the service of Dr. Leo Eloesser at the San Francisco Hospital and on animals for direct and through-the-skin stimulation of peripheral nerves and for stimulation of the cortex cerebri.

It is felt that if faradic current used in a given project is accurately characterized as regards intensity, frequency and wave form there may be more uniformity in results of electrical stimulation of nervous tissue. We are left with two objectionable variables: the physical status, degree of narcosis, etc., of the subject; the complex phenomenon "spread." Concerning the second we are attempting to gather some information in the surgical laboratory at Stanford.

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AN APPARATUS FOR REMOVAL OF DELETERIOUS BACTERIA FROM CERTAIN PROTOZOAN CULTURES

PROTOZOA cultures periodically become contaminated with deleterious bacteria. When this occurs the metabolic activity of the culture is lowered and often the clone is lost.

The following is a description of an apparatus based on the migration which protozoans show in an electric field towards the cathode. This enables the operator to remove a high percentage of harmful bacteria, and allows the culture to resume its normal growth.

Two platinum wires are fused into the side of a pyrex petre dish. A U-shaped piece of glass tubing is closed at both ends and the longitudinal surface ground, until an open channel results. This channel is filled with sterile hay infusion. The two platinum wires are placed at the extreme end of the glass channel, while the free ends are connected to a suitable electric current.

The protozoa to be partially sterilized are placed near the anode and the current turned on. Under the influence of the electric field the protozoa swim towards the cathode, leaving the bacteria behind them. They are then removed from the fluid by means of a capillary pipette as they near the cathode.

Paramecia treated as described above were no longer seriously contaminated by harmful bacteria. Although far from completely sterilized, they were able to resume normal growth.

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