substance, we have recently discovered that wide variations in the ratio of secretory to motor inhibition may occur in preparations subjected to different methods of concentration. This suggests that enterogastrone may consist of two principles, one which inhibits secretion and one which inhibits motility. A difficulty in the biological assay has arisen from the fact that animals occasionally become refractory to enterogastrone preparations because of protein impurities.[7] For this reason we have not tried our preparation in the treatment of "peptic" ulcer.

Our attention has been recently directed to the urine as a possible source of enterogastrone uncontaminated by the protein impurities which are present in the mucosal extracts. Sandweiss, Saltstein and Farbman[8] recently reported that extracts of pregnancy urine (Antuitrin-S) containing the gonadotropic hormone, prolan, are potent in preventing the development of jejunal ulcers in dogs subjected to the Mann-Williamson operation. Culmer, Atkinson and Ivy[9] have administered extracts of pregnancy urine daily to Pavlov pouch dogs and observed a significant reduction in gastric secretion. Since the inhibition was evident on the first day, within one-half hour after the first injection of the extracts, it was concluded that the latter had a direct action on the gastric glands. Necheles has stated that he was able to extract from human urine a substance which inhibits gastric secretion.[10] At the San Francisco meeting of the American Medical Association, Sandweiss and associates reported that extracts of normal female urine are also potent in preventing experimental ulcers in dogs. This finding definitely excluded prolan as the active constituent, since this hormone is believed to originate in the placenta. Recently Sandweiss placed at our disposal a sample of this extract of normal female urine, which we found to be potent in inhibiting gastric secretion in dogs. Since the first possibility to be considered in explaining this observation is that enterogastrone is excreted in the urine, we have attempted to extract the chalone from this source.

We have found that extracts of normal male urine, prepared by benzoic acid adsorption or tannic acid precipitation,[6] are very potent in inhibiting gastric secretion. Three milligrams of solid material, representing approximately 150 cc of urine, contain one enterogastrone unit of activity. This material is approximately 16 times as potent as the usual material prepared from the duodenal mucosa of hogs. Two dogs which have become refractory to mucosal preparations have responded to the urine extracts. No inhibition of gastric motility has been obtained with as much as three milligrams of the urine preparations, so that either the substance acting on gastric motility is not eliminated in the urine or else the method employed does not recover it. An assay carried out on five immature rats has revealed that three mgs of the urine preparations exhibit no trace of gonadotropic activity. The active principle is not affected by boiling for five minutes.

Although both the chemical and biological behavior of the substance in urine resembles that of duodenal preparations of enterogastrone, we can not as yet state that the active constituent of urine is actually enterogastrone. Attempts to identify the principle are in progress.

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[7] J. S. Gray and E. Wieczorowski, *Proc. Soc. Exp. Biol. and Med.*, in press.

[8] D. J. Sandweiss, N. C. Saltstein and A. Farbman, *Am. Jour. Dig. Dis. Nut.*, 5: 24, 1938.

[9] C. Culmer, A. J. Atkinson and A. C. Ivy, in press.

[10] H. Necheles, *Proc. Am. Gastroenterol. Soc.*, May, 1938.

NICOTINIC ACID IN SWINE NUTRITION

IN November, 1938, a herd of pigs in northwestern Pennsylvania was reported to the agricultural extension specialists of the Pennsylvania State College as being sick and unthrifty. These pigs were farrowed in September and weighed from twenty to forty-five pounds. Out of a total of seventy-six pigs, forty had died during October and November. The surviving pigs had stopped growing, were without appetite and were affected with diarrhoea and a dermatitis on the body and ears which had the appearance of a heavy scurf. This condition developed while the pigs were being fed a ration of corn, oats, wheat middlings, tankage (34 per cent. protein) and a limited amount of skimmed milk. They had access to good grass pasture which had never previously been used for swine.

At the time the case was reported these pigs were accustomed to huddle in their pens rather than to take advantage of the available pasture. When food was placed before them they would come to the trough, eat a small amount and refuse the remainder of the feed.

The condition of these animals baffled the local and district veterinarians and the case was brought to the attention of the college swine specialist. It was then noted that the symptoms of the disorder were similar to those reported by Chick and co-workers,[1] with pigs suffering from nicotinic acid deficiency on a diet consisting largely of maize. As a result of this observation seven pigs, having been selected as being in the poorest condition of any in the herd, were given 50 mg daily of nicotinic acid mixed in a minimum amount of

[1] *Biochem. Jour.*, 32: 10–12, 1938.

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.

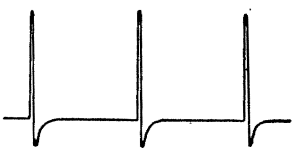

FIG. 1. Tracing of oscillograph image of wave form delivered by stimulator. Wave form constant over the range of intensities.

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.