The above data do not refer in any regard to the etiology of the toxemia, but do suggest that those patients who develop convulsions (eclampsia) in the course of their toxemia may have a primary cerebral dysrhythmia.

It may be inferred from the preceding that a careful history together with an electroencephalogram may be of great importance in determining those patients who may develop eclampsia. Furthermore, it is apparent that the proper therapy of eclampsia and pre-eclampsia may include those measures generally employed in the treatment of cerebral dysrhythmia. In accord with this, studies are now in progress to elucidate the action of dilantin and other anticonvulsants in the eclamptic and pre-eclamptic states.

Summary. Seventy-seven percent of 17 eclamptic women had electroencephalograms indicative of cerebral dysrhythmia. Fifty-eight percent of this series gave a family history of convulsive disorders.

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Effect of a Vacuum on Destruction of Bacteria by Germicides.

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The presence of a vacuum was found to have no effect on the destruction of bacteria by germicides. Regardless of whether the organisms were mixed with the germicidal dilutions and kept at atmospheric conditions or placed under a vacuum, the final results were the same.

Entirely different results were obtained, however, when gaseous germicides were employed. Tests carried out over a period of about 15 years have shown that the efficiency of the gases was greatly increased in the presence of a vacuum. In fact, under certain conditions organisms could not be destroyed unless a vacuum was employed.

Experimental. The gases which were tested included formaldehyde, methyl bromide, methyl formate, ethylene oxide, and carbon disulfide. With the exception of formaldehyde no one of the gases effected a sterilization after an exposure period of 2 hours. These non-germicidal gases are important for the destruction of insects

but are of very little, if any, value for the destruction of bacteria. Therefore, all tests were limited to the use of formaldehyde.

The organisms used included *Staphylococcus aureus, Streptococcus faecalis, Pseudomonas aeruginosa, Escherichia coli, Eberthella typhosa, Bacillus subtilis, Bacillus mycoides,* and *Bacillus anthracis.* Cultures incubated at 37°C for 72 hours were employed in the tests. In general, it was found that cultures increased in resistance up to 72 hours, after which the reverse effect occurred.

Two series of tests were performed. In one series a drop of culture was spread over the surface of small glass slides whereas in the other series a drop of culture was absorbed on short pieces of dental cotton rolls (Fig. 1). The glass or cotton preparations were used either immediately or dried for 3 hours at 37°C previous to treatment with formaldehyde.

The vacuum chamber used for the treatment of cultures is shown in Fig. 2. The door to the chamber comes in contact with a rubber gasket to produce a vacuum-tight tank. A small metal cylinder, tapered at the base and open at the top, is fastened to the inside of the door by means of clips, so that it may be easily removed for cleaning. This cylinder is placed directly below a cup situated above and outside of the sterilizer. A vacuum gauge is connected to the top of the chamber.

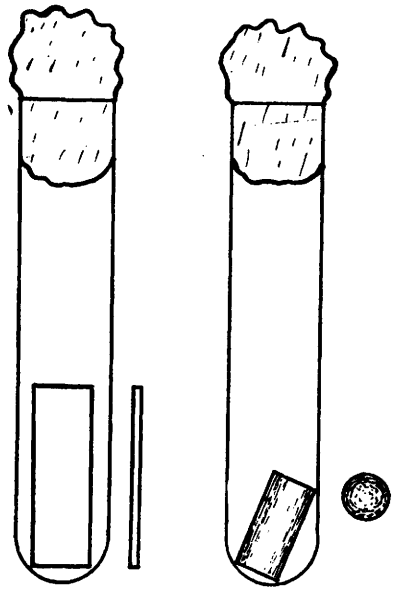

FIG. 1.

Tubes containing glass or cotton preparations of cultures used in the sterilizer tests.

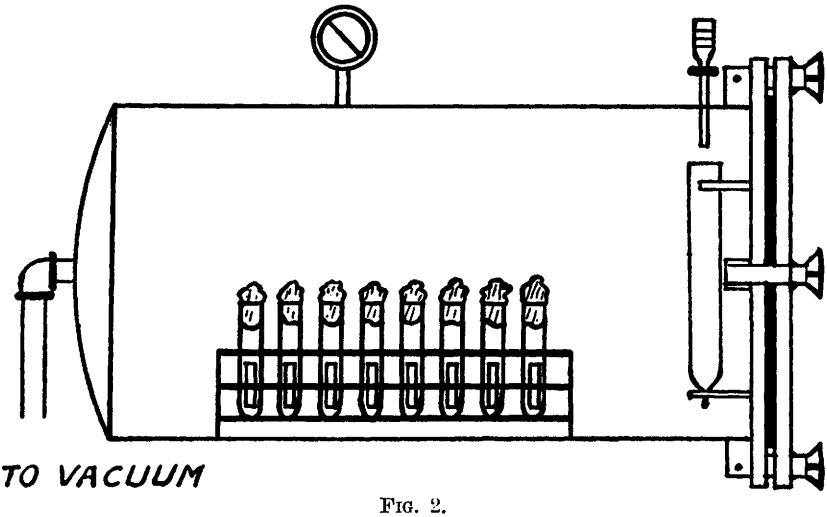

FIG. 2.
Vacuum sterilizer used for the treatment of the cultures.

The sterilizer is operated as follows: An appropriate amount of potassium permanganate in crystalline form is placed in the small cylinder fastened to the door. The cultures to be treated are placed inside of the sterilizer and the door tightly closed. The sterilizer is evacuated to 29 mercury inches (1 inch of pressure). A measured amount of solution of formaldehyde is pipetted into the cup on the top of the tank and allowed to slowly run into the metal cylinder fastened to the door. When the solution of formaldehyde comes in contact with the potassium permanganate, considerable heat is quickly generated volatilizing the formaldehyde gas. Sufficient solution is used to produce a drop of only one inch in the vacuum. Each cubic foot of sterilizer space required 6 cc of formaldehyde (commercial 37% solution) and 6 g of potassium permanganate. The sterilizer is held at 28 inches of vacuum throughout the entire exposure period. At the end of the exposure period, air is readmitted to the sterilizer and when the gauge reads zero the door can be opened.

The cultures were tested for sterility by dropping glass slides or cotton rolls into large test tubes containing 20 cc of nutrient broth. All tubes were incubated at 37°C for one month before making final readings.

Absence of a Vacuum. The first tests were performed by generating formaldehyde inside of the sterilizer, in the absence of a partial vacuum. The same amounts of formaldehyde and potassium permanganate were used as in the vacuum procedure. The periods of exposure to formaldehyde were for 1 hour and 2 hours. The cultures were absorbed on cotton rolls and dried for 3 hours previous

TABLE I.
No Vacuum.
One drop of a 72-hour culture of each organism was absorbed on cotton and dried 3 hours at 37°C previous to use.

Culture	Control tubes	Period of exposure to formaldehyde	
		1 hour	2 hours
Staph. aureus	+	+	+
Strep. faecalis	+	+	+
Ps. aeruginosa	+	+	—
E. coli	+	+	+
E. typhosa	+	+	—
B. subtilis	+	+	+
B. mycoides	+	+	+
B. anthracis	+	+	—

to use. The results are shown in Table I. It may be seen that an exposure period of 2 hours was not sufficient to effect a complete sterilization of all cultures. *Bacillus subtilis* showed greater resistance than any of the organisms employed in the tests. This organism was also more resistant to formaldehyde when exposed in a partial vacuum.

Presence of a Vacuum. Cultures on cotton were exposed to formaldehyde in the presence of 28 inches of vacuum for periods of 5 min 10 min and 25 min. The results are given in Table II. It may be seen that complete sterilization of all cultures was effected after an exposure period of 25 min. The results demonstrate the increased efficiency of formaldehyde in a vacuum as compared to its use under atmospheric conditions.

Cultures on glass slides were exposed to formaldehyde in the presence of 28 in. of vacuum for periods of 10 min., 25 min., 40 min., and 50 min. The results are also recorded in Table II. A

TABLE II.
Vacuum.
One drop of a 72-hour culture of each organism was absorbed on cotton or spread over the surface of glass slides and dried 3 hours at 37°C previous to use.

Culture	Control tubes	Period of exposure to formaldehyde						
		Cotton rolls			Glass preparations			
		5 min.	10 min.	25 min.	10 min.	25 min.	40 min.	50 min.
Staph. aureus	+	—	—	—	—	—	—	—
Strep. faecalis	+	+	+	—	—	—	—	—
Ps. aeruginosa	+	—	—	—	—	—	—	—
E. coli	+	—	—	—	—	—	—	—
E. typhosa	+	—	—	—	—	—	—	—
B. subtilis	+	+	+	—	+	+	+	—
B. mycoides	+	—	—	—	—	—	—	—
B. anthracis	+	—	—	—	—	—	—	—

period of 50 min. was required to destroy all of the organisms on glass slides whereas corresponding cultures on cotton were completely destroyed after an exposure of only 25 minutes.

Conclusions. It may be stated that the increased efficiency of formaldehyde as a germicide was not due to any effect of the vacuum on the gas but rather to the ability of the vacuum to increase the penetration of the gas. Formaldehyde is chiefly a surface disinfectant. The increased penetration in the presence of a vacuum made it possible for the gas to reach the organisms. The vacuum principle is capable of producing a very deep penetration of the gas into porous materials. The method is very efficient, cheap, easily performed, and indispensable for the sterilization of objects likely to be injured by the application of dry or moist heat.

13686 P

Reactions of 2-Methyl-1, 4-Naphthoquinone (Menadione) with Whole Blood and Plasma *in vitro*.

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Recently Seligman and coworkers[1] reported that vitamin K_1 has such a persistent and prolonged action that a single small dose is adequate for the treatment of even severe cases of hypoprothrombinemia, and may well do the work of repeated doses of other agents. This point has been emphasized by Fieser.[2] In the course of our work on the development of an oxidation-reduction method for the determination of vitamin K_1[3] it was found that the vitamin is remarkably stable in whole blood, but menadione is rapidly destroyed, and further menadione, unlike the vitamin, causes a marked methemoglobin formation.

Experimental. An oxalated sample of freshly drawn dog blood was divided into three 30 cc samples. 1.5 mg of 2-methyl-1,4-naphthoquinone, an equivalent weight of 2,3-dimethyl-1,4-naphtho-

1 Seligman, A. M., Hurwitz, A., Frank, H. A., and Davis, W. A., *Surg. Gynecol. Obstet.*, 1941, **78**, 686.

2 Fieser, L. F., *Ann. Int. Med.*, 1941, **15**, 648.

3 Scudi, J. V., and Buhs, R. P., *J. Biol. Chem.*, 1941, **141**, 451. (See also paper in press.)