so that the contents of the yolk escaped. The membrane was removed, washed four times in distilled water, and mounted in glycerol between two crystal quartz microscope slides. The preparation was then

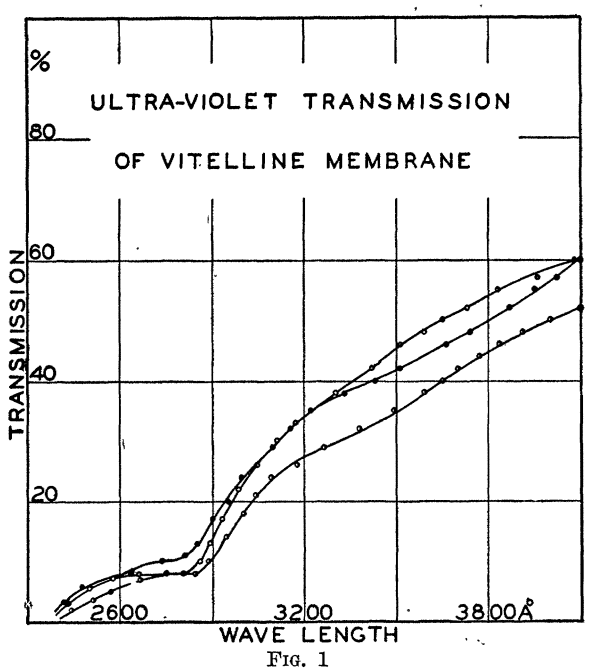

FIG. 1

sealed at the edges with paraffin. Owing to the natural spherical contour of the vitelline membrane, it was not possible to avoid folds entirely when placing it between flat slides; however, the fractional area covered by such folds was estimated to be considerably less than 10 per cent. of the total area of the membrane in the light path.

Transmission measurements were made with a Spekker photometer and a Hilger medium quartz spectrograph. A control consisting of a 10 micron layer of glycerol between another pair of similar crystal quartz slides was employed. The results are shown in Fig. 1, where the per cent. transmission is plotted as a function of the wave-length for each of three separate trials.

It will be noted that selective absorption occurs in the region around 2,800 Å. Since these membranes scatter light noticeably in the visible, it is to be expected that they would do so more strongly in the ultraviolet and that scattering would be responsible in large measure for the low transmission at 4,000 Å. That this is true was demonstrated in an attempt to measure the transmission with a quartz microscope and photocell, in which case the transmission was observed to increase greatly with increased numerical aperture of the objective. To account for the absolute differences in transmission between the three sets of measurements, one must consider natural fluctuations in thickness and possibly variations in membrane composition. It is intended that these results will call attention to the order of magnitude of the transmission; in any given irradiation experiments, it would probably be necessary to make measurements on the particular egg samples employed.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A SIMPLE APPARATUS FOR PRESSURE FILTRATION

THE sterilization of protein solutions by Seitz filtration using positive pressure requires a motor, a pump and a tank, all of which are expensive for the small laboratory in which they may be needed at infrequent intervals. Suction produced by water aspiration is slow and noisy and, in addition, since protein solutions foam under reduced pressure, requires "venting" of the system with its possible contamination. We have, in this laboratory, devised a simple, inexpensive instrument suitable for the small laboratory in which there is no compressed-air system.

The tank consists of a single length of six-inch-diameter pipe capped at both ends. One end serves as a base. The other end is pierced by ordinary iron pipe into which is threaded a pressure gauge and two outlets. To one outlet is fixed a tube ending in an automobile tube valve stem. Through this, using a bicycle pump, the tank can be charged. To the other outlet is fixed a piece of fabric-covered pressure tubing ending in an automatic air chuck of the type used on air hoses with which tire tubes are inflated. The pressure cap of the Seitz filter is fitted with a standard valve stem which fits the automatic valve chuck of the tank. The exact details are shown in Fig. 1.

Since the length of fabric-covered tubing may be varied, the tank can be placed in any convenient part of the laboratory. Seitz filters can be set up in groups and several filtrations done at the same time. As filter pads become clogged, the pressure in the tank may be increased so that the rate of filtration is constant. The pressure in the tank can be raised by the pump while filtration is taking place.

Certain details of operation must be given special consideration. Before filters are autoclaved, the pads must be moistened, centered exactly and screwed firmly into place. After sterilization, the screw must be tightened mechanically by pliers. If the pad is loose, or if it is not centered, some fluid may be forced

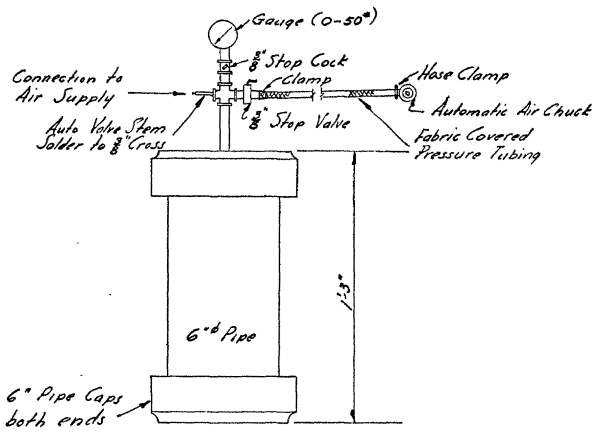

FIG. 1.

around, instead of through, the pad and so escape filtration. While the last charge is passing through the pad, it is best to release the air pressure in the filter chamber before all of the charge has passed through. With this technique, the pad remains moist and, since no air is forced through it, no foam is produced.

By the use of this apparatus, sterilization of protein solutions by Seitz filtration becomes rapid, noiseless, inexpensive and foam-free. The instrument can be made by any competent mechanic.

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AN ELECTRONIC RELAY WITH IMPROVED CHARACTERISTICS

THE electronic relay for heat control, reported by Hall and Heidt in a recent issue of SCIENCE,[1] is substantially identical with a circuit previously described.[2] The circuit was suggested as a variation, suitable for use with DC power lines, of another which applied about half as much voltage across the thermoregulator contacts when both were supplied from the AC mains.

There are now available new tube types which permit some improvement of this circuit, and which require about half as much power for operation. The latter is not negligible, since with continuous operation the power used costs roughly as much per year as the original price of the relay parts. Such a circuit is shown below. When AC operated, the current through the thermoregulator contacts is about one tenth of the peak current with the Hall-Heidt circuit and the maximum potential across the regulator is less than ten volts instead of 35.

[1] A. C. Hall and L. J. Heidt, SCIENCE, 92: 133, 1940.

[2] R. C. Hawes, *Ind. Eng. Chem., Anal. Ed.*, 11: 222, 1939.

The relay is adjusted by placing strap A about two thirds of the way up from the amplifier cathode on resistor R_1 (the adjustment is not critical) and straps B and C at the ground end of R_2. B is then moved toward the cathode until the relay closes. C is moved toward B and the regulator circuit alternately shorted

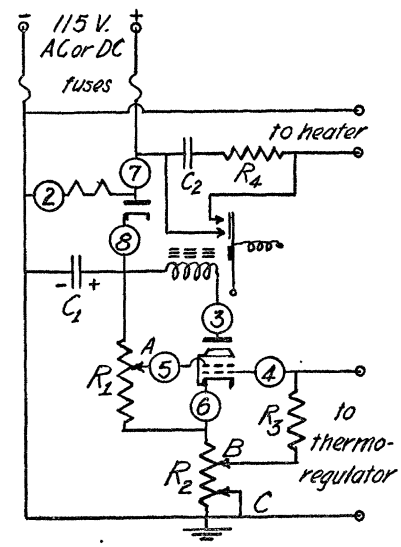

FIG. 1. Tube: 117N7-GT. Octal socket terminals are indicated by the encircled numerals. Terminal 1 has no connection. Relay: DC; 3,000. ohm, 20. milliampere coil (Leach #1201, or equivalent). R_1 4,000. ohms, R_2 1,000. ohms. Both 10. watt, adjustable. An extra strap should be bought for R_2. R_3 1. megohm, ½ watt. R_4 100. ohms, 2 watt. C_1 8. microfarad, 200 v. electrolytic. C_2 0.5 microfarad, 400 v. paper.

and opened until C is as close to B as will permit the relay to open when the control circuit is shorted. Some leeway in these adjustments is advisable to allow for line voltage fluctuations. Care should be taken to connect the relay to the line with the proper polarity if, as is usual, one side of the line is grounded. The circuit may be used with a bimetal thermoregulator by interchanging the leads at B and C.

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