microscope are then placed in the holes seen in the surface view $\frac{3}{4}$ inch from each side and $\frac{5}{8}$ inch from the lower edge. These are used to hold the large 2 inch by 3 inch slide or heavy cover glass on which the culture is placed. The cover glass is essential if the work to be done requires the higher powers of magnification. The culture is suspended in a hanging drop in the center of the square opening shown in the surface view and in the projections below and to the left. The instrument to be used is held in one hand and enters the moist chamber through the opening seen in the projection to the right.

The wet filter paper which is placed around the chamber maintains a humidity sufficiently high to prevent any considerable amount of evaporation from the culture over quite a long period of time. It is possible, therefore, to keep eggs in the chamber under constant observation until they reach the stage desired for operation and afterward to follow the immediate effects of the manipulation before transferring them to other containers without subjecting them to a hypertonic medium. This was done regularly in the experiments mentioned above. It is wise, however, if the culture is to remain in the cell for a relatively long time, to close the open end temporarily with a small door of cardboard or some similar material to reduce the area of exposure through which evaporation may take place.

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A CONSTANT-RATE DROPPING DEVICE FOR LIQUIDS[1]

IN SCIENCE, Vol. 79, No. 2059, p. 545, Dr. J. H. Wales, of Stanford University, describes a "Device for Constant Flow of Liquids," which is similar to one I devised a number of years ago, and which is described on page 76 and illustrated in Fig. 3 of the British Medical Research Council Report of 1923 entitled "The Wasserman and Sigma Reaction Compared."

Another device for the same purpose is illustrated herewith, which has the advantage that the distance between the dropping tube and the receiving vessel is held constant. In operation, fluid from the reservoir "R" is allowed to flow into the apparatus, the

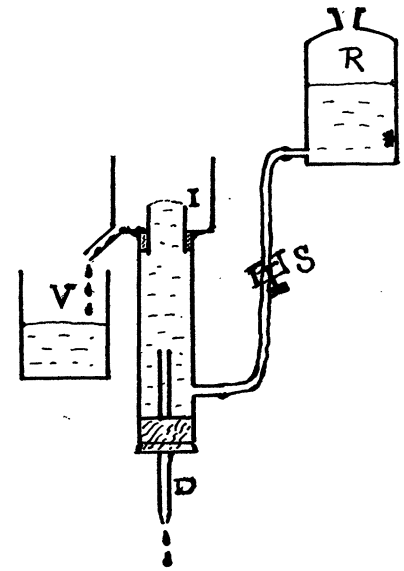

FIG. 1.

rate being adjusted by the screw-clamp "S" until a slight excess runs over the edge of the inner tube "I" continuously. This excess collects in vessel "V" and may be returned to the reservoir. The number of drops delivered per minute depends on the size of the orifice of the dropping tube "D" and the distance between this orifice and the top of the inner tube "I." The dropping rate may be adjusted, within limits, by sliding the tube "D" up or down through its cork.

The outer shell of the apparatus was made from an old student-lamp chimney; the edge of the inner tube "I" was ground flat on a rough stone so that the excess fluid would flow smoothly over it; the inner tube was held in place by a piece of thick rubber tubing, filling the space between it and the outer shell.

H. F. PIERCE

SPECIAL ARTICLES

THE ACTION OF HIGH FREQUENCY SOUND WAVES ON TOBACCO MOSAIC VIRUS[1]

RECENTLY Takahashi and Christensen[2] reported that tobacco mosaic virus is inactivated by high frequency sound waves.[3] They found that the inactivation of virus progressed with exposure, until

[1] From the Wilmer Institute of the Johns Hopkins University and Hospital.

[1] Thanks are due Professor E. Newton Harvey for the use of his laboratory where all the radiation experiments were performed, and Mr. Charles Butt for the use of his high frequency oscillator and for much helpful technical assistance.

[2] William N. Takahashi and Ralph J. Christensen, "The Virucidal Action of High Frequency Sound Radiation," SCIENCE, 79: 415, 1934.

[3] For a general survey and literature on supersonic waves see: E. Newton Harvey, "Biological Aspects of Ultrasonic Waves, a General Survey," *Biol. Bull.*, 59: 306–325, 1930; Leslie A. Chambers and Newton Gaines, "Some Effects of Intense Audible Sound on Living Organisms and Cells," *Jour. Cell. and Comp. Physiol.*, 1: 451–471, 1932.