The speed of movement during exposure need not be absolutely constant, for changes in speed will merely produce longitudinal stripes. Some vertical banding will occur because of differences in the slope of the line. A little consideration will make it apparent that the line is widest, so far as the direction of movement is concerned, where the slope is steepest, the time of exposure is a function of the "width" of the line. Differences in slope are closely related to frequency and wave-form, however, and experience has shown that this type of banding is not ordinarily a serious source of error. It can be almost entirely eliminated if a high contrast print is made from the shadowgram.

The theory on which the procedure is based is exceedingly simple. When a point of light is moved on a photographic film, it forms a line. When a line is moved, it forms an area. When the image of a wavy line is moved at right angles to its long axis, it will widen, and, if moved far enough, it will become so wide that half the line can be disregarded and its characteristics will be correctly represented by its margin.

FREDERIC A. GIBBS

A METHOD FOR THE STUDY OF INVERTEBRATE BLOOD IN VITRO

THE blood elements of many invertebrates disintegrate very rapidly when exposed to air and their study in the hanging drop is extremely difficult. This is particularly the case with the various types of trephocytes, but the amebocytes of some species present similar obstacles.

The following method was found suitable for this kind of observation. A capillary about 3 to 4 cm long and not over 0.25 mm thick is drawn out from a glass tube of 3 to 4 mm external diameter. About 5 cm of the glass tube are left for handling and a

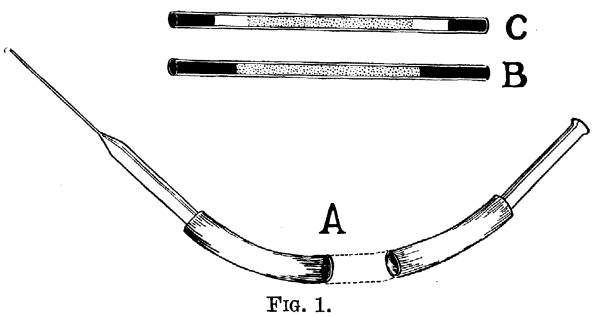

FIG. 1.

rubber tube attached to it (Fig. 1A) through which suction is applied when necessary.

When used, first the end of the capillary is dipped into pure mineral oil till a column of a few millimeters is drawn up by capillary attraction. The oil adhering to the outer surface of the capillary is wiped off and the latter carefully inserted into the body cavity or blood vessel like a syringe needle. Capillarity will draw the body fluid up whilst pushing the paraffin column ahead; if this for some reason is insufficient, suction is applied through the rubber tube.

After a column of 1 to 2 cm of blood has been drawn up, the capillary is removed from the body and is instantly dipped again into mineral oil drawing up another 2 to 3 mm of it. Thus the capillary contains a column of body fluid enclosed between two columns of mineral oil (Fig. 1B).

Now the capillary is broken off just above the liquid, placed in a drop of mineral oil on a slide, and covered. For observation with immersion it is advisable to use mineral oil instead of cedar oil.

If necessary, the method can be applied without exclusion of air either by omitting the use of mineral oil or by drawing in small columns of air before and after drawing the blood. In the last case the blood column is separated on both ends by air from the mineral oil (Fig. 1C).

This method has some other advantages over that of the hanging drop. The corpuscles adhering all around the capillary wall are seen from above, below and in profile. By slightly moving the cover glass the capillary is made to turn, thus enabling observation of a single element from various angles. The method is also useful for the study of blood in very small forms, where its quantity is so minute as to make the preparation of a hanging drop rather difficult.

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