photronic cell, a Weston galvanometer, model 440, a three-way toggle switch and small lengths of copper wire for shunts and connections. The cell is connected directly across the galvanometer, which may be shunted to give the desired range. The three-way switch will allow four ranges. It connects a shunt for each position, and the most sensitive range is obtained with the switch in the neutral or open position. Each position of the switch may be calibrated in terms of foot-candles by means of ordinary electric lamps of known candle power, at measured distances. (Incidentally, the equipment used by the writers was also calibrated against a similar one made by a professional supply house and it was found that the home-made device was fully as sensitive and showed no greater errors than the professional equipment.)

When the above-mentioned galvanometer is shunted with the proper resistance and used with the photronic cell, intensities of illumination from 10 to 15,000 foot-candles may be measured accurately and the deflection is strictly proportional to the illumination over these ranges.

This equipment, housed in a small wooden case, has been used daily in the field during the Irish potato growing season in southern Arkansas[2] for determining differences in amount of illumination, on plants variously treated, in order to ascertain the possible influence of intensity of illumination on the etiology of tip and margin burning of Irish potato leaves. The simplicity and sturdiness of the instrument, its sensitivity over a relatively wide range of illumination and ease of manipulation have commended it to the writers, aside from its relative cheapness.

H. R. ROSEN
W. M. ROBERDS

UNIVERSITY OF ARKANSAS

AN IMPROVEMENT OF THE CHAMBERS MICROMANIPULATOR

THE Chambers micromanipulator modified by Wright and McCoy works very well for making single cell cultures of bacteria after one manages to get the mouth of the pipette in focus of the low power objective. But much time and patience are consumed before this is accomplished. There is a coarse vertical adjustment operated by a screw, but for both horizontal movements the pipette must be manipulated by hand. The difficulty is that the pipette usually touches the side of the moist chamber before it can be centered and must be discarded for fear of contamination, if it does not break.

To provide a relatively fine adjustment for the horizontal movements, the fitting A (Fig. 1) was cut

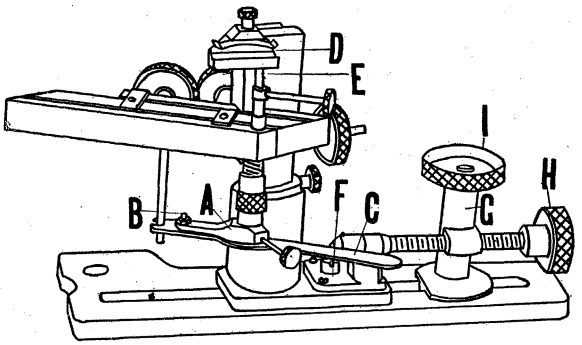

FIG. 1

off and the slotted lever C was secured to it by the bolt B and by engaging the notched end of C into the rod that extends downward from the instrument. A slot in the lever C also engages the screw head at the base of the rod E, which carries the pipette holder D. By moving the handle of the lever C back and forth, the pipette holder also moves back and forth. But its movement is limited by the slot in the lever C. This produces a limited movement of the pipette across the field (from 6 o'clock to 12 o'clock). To move the pipette from right to left, a second attachment is used. The fitting F is securely screwed into the base of the manipulator. The long screw attached to the knob H moves freely in this fitting (F), but engages a thread in the standard G. This standard (G) can be clamped to the runway at any place by turning the knob I. Then turning the knob H moves the pipette from right to left or *vice versa*.

These modifications were designed and made by Mr. Thomas McG. Aiken, of the Aiken Camera Laboratory, Pittsburgh. The writer merely explained to him the difficulties experienced.

The usual technique of blowing and sucking on a tube attached to the pipette was found too difficult by

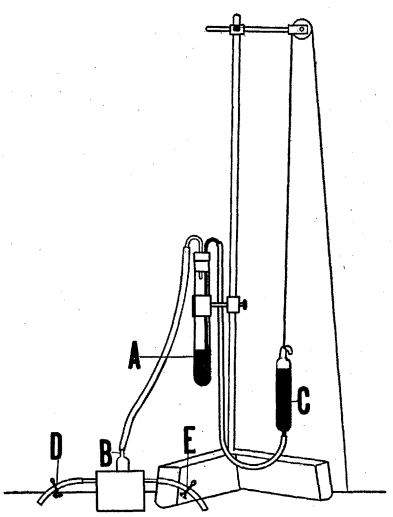

FIG. 2

[2] Fruit and Truck Branch Experiment Station, Hope, Arkansas.

the writer when the mouth of the pipette is small. It also seems to be a contributory factor in the causation of colds, possibly due to the effort and the contamination of the old saliva. Pressure and suction can be applied and regulated by the device shown in Fig. 2. A well of mercury (A) is attached to the pipette by the T-tube B mounted in a block of wood. The tube holding the spring clamp D leads to the pipette; the tube holding clamp E to the air. When pressure is desired, the bulb C is raised by pressing a foot treadle and the clamp D is opened. When suction is desired, the spring clamp E is opened and the bulb C is raised until the well A is nearly full of mercury. Then the clamp E is closed, the bulb C is dropped and suction is applied to the pipette by opening the clamp D.

CARL C. LINDEGREN

INSTITUTE OF PATHOLOGY
DR. R. R. MELLON, DIRECTOR
WESTERN PENNSYLVANIA HOSPITAL
PITTSBURGH, PA.

SPECIAL ARTICLES

INSECT TRANSMISSION EXPERIMENTS WITH HERPESENCEPHALITIS VIRUS[1]

THE recent demonstration by Kelser of the fact that the virus of equine-encephalomyelitis can be transmitted by *Aedes aegypti* suggested the possibility that some of the other neurotropic filterable viruses might likewise be transmissible either through this mosquito or through other species of insects. Also, in spite of the present uncertainty as to the etiological relationship between such viruses and epidemic human encephalitis, it was believed that insect transmission experiments might add to our limited information concerning the methods by which this disease is spread.

With this possibility in mind preliminary experiments were begun in April, 1933, using a laboratory-bred strain of *Aedes aegypti* and several neurotropic viruses including (a) the well-known E1–1–Perdrau strain of herpes-encephalitis virus isolated in 1925 from a human case of encephalitis, (b) a virus designated as "W," more recently isolated from an acute fatal human case of ascending paralysis, and (c) the Le Fevre strain of herpes virus originally isolated from a case of herpes genitalis. For the first two viruses we are indebted to Dr. F. P. Gay and Dr. M. Holden, of Columbia University, and for the other to Dr. E. B. McKinley, of George Washington University.

The various mosquito-transmission experiments have conformed to the following general plan: (1) An infective dose of the tissue containing the virus was inoculated into one or more normal animals. (2) On each succeeding day of the test these animals were immobilized and placed in a sterilized feeding cage containing 50 to 100 normal female *Aedes aegypti*. At the end of the feeding period all mosquitoes which failed to ingest blood were caught and destroyed; those remaining in the cage were counted, given a lot number and reserved for the transmission tests. (3) After arbitrarily selected intervals, ranging from 5 to 55 days, the potentially infected mosquitoes of each lot were tested by allowing them to feed on normal animals. These feeding tests were carried out in clean rooms never previously used for virus experiments; after being bitten, each test animal was placed in a sterilized cage and isolated throughout the entire period of its observation. (4) When an animal died the brain and in some instances the spinal cord was removed as soon as possible. Half of the brain was fixed in Zenker's solution or in formalin and prepared for histological study; a portion of the remaining half was used for transfer to other animals by subdural or intracutaneous inoculation; and the rest of the brain was preserved in 50 per cent. glycerin at 5° C.

At the present stage of the investigation we are unable to draw definite conclusions as to the transmissibility of these three viruses by *Aedes aegypti*. However, some of the results strongly suggest that this may have occurred; and it is to certain of these observations that we wish to call attention in this brief progress note.

The results obtained in one experiment with the E1–1–Perdrau virus are indicated diagrammatically in Chart I. On April 6 infective amounts of the virus were inoculated subdurally and intracutaneously into two normal rabbits (R–1 and R–2); both of which died 4 days later. Forty-eight and 72 hours after inoculation, normal *A. aegypti* were fed on both animals and these mosquitoes were designated as Lots 1B and 2B, respectively. The *A. aegypti* of Lot 1B, which had ingested blood of the inoculated rabbits at the end of 48 hours, were first tested on April 14, when five mosquitoes bit a normal rabbit (R–384), and again on April 21, when six fed on another (R–396). Both animals died; the former after 50 days and the latter after 16 days. Histological sections of the brain from one animal (R–384) were negative, while those from the other (R–396) contained lesions characteristic of encephalitis. Transfer of a suspension of the fresh brain of R–384, by intracutaneous inoculation into a normal rabbit (R–495) was followed by death 10 days later; and transfer of brain from R–396 to four normal rabbits (R–416,

[1] A preliminary note.