

accumulation of solutes by living plant cells:
(i) It is simple and inexpensive in design;
(ii) in the case of a hand-microtome the soft tuber material will have to be either unsupported or mounted in pith which often leads to uneven cutting. The cork-borer used in

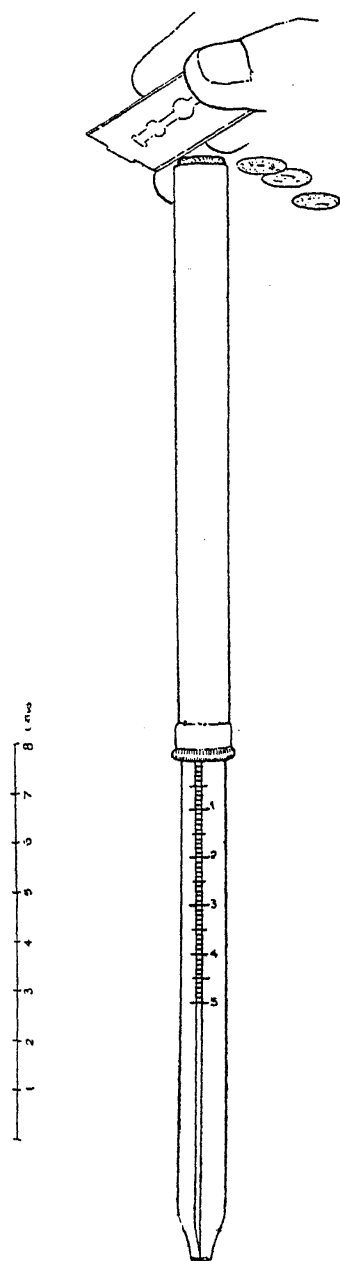


FIG. 1

this apparatus, on the other hand, gives a good support to the material during the process of cutting discs thus ensuring a fairly uniform surface.

For the above-mentioned experiments it is of course necessary to have as thin and even a disc as possible. The ideal condition would be to have only one layer of cells as pointed out by Baptist. It is, however, very difficult in practice to achieve this without injuring the cells. The difficulty is obviously overcome by cutting discs having four or five layers of cells which have been found to sufficiently minimize the time-lag necessary for the different layers of cells to attain equilibrium.

As use of a razor or a razor blade is common to the present arrangement as well as to any standard hand-microtome available in the market the uncertainties of the personal factor are likely to affect the evenness and contour of the cut surface. This constitutes a serious drawback in instruments of this nature.

This defect can, however, be remedied by making use of a mechanical device for cutting sections. Attempts are being made at this Institute to make a hand-microtome with a mechanical device for cutting sections.

In the meanwhile it is hoped that this simple device will prove useful to research workers as well as to teachers for practical demonstration work in physiological laboratories.

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December 5, 1946.

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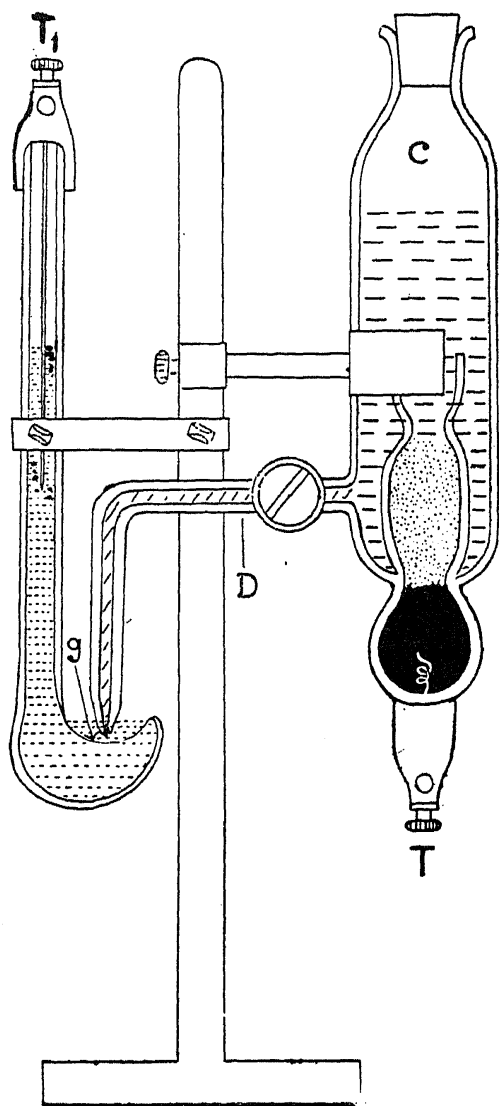
A MICRO-GLASS ELECTRODE FOR pH DETERMINATION

ATTEMPTS^{1,2,3,4,5} have been made from time to time to construct glass electrodes of suitable designs. They, however, suffer from serious disadvantages such as difficulties in cleaning and filling, leakage paths necessitating thorough insulation, requirement of 20 to 30 ml. of liquid of unknown pH, high resistance of the system, etc. Claff² has recently devised a glass electrode for determination of pH of small quantities of culture media. Great care has to be exercised in preventing air bubbles from vitiating pH measurement with such a glass electrode.

In the course of physiological work on soil-plant growth, a need was felt for designing a glass electrode which could be used with very small quantities of plant extracts. Essential details of such an electrode are featured in Fig. 1.

The conducting membrane *g* (about 25 μ in thickness) is blown in the form of a small cup (15 mm. diameter, 7 mm. depth) in the upper region of an eccentrically blown bulb of (Corning 015) glass of high conductivity which is itself quite thick-walled. The total capacity of the cup is about 1 ml. The bulb is filled with a saturated solution of quinhydrone in 1 N HCl. Contact is made by a platinum wire connected with the gold plated terminal T_1 . Contact between the liquid of unknown pH and the saturated calomel electrode *C* is made by means of the KCl-bridge *D* in such a manner that the end of the tube rests just above the glass membrane *g*.

Method.—A Cambridge Direct Reading pH Meter calibrated for a range of 14 pH units (Cambridge Instruments for Hydrogen-ion measurements List, No. 108) was found to be suitable in combination with the above electrode system. The standardization of the instrument is checked at frequent intervals.



Comparative pH determinations of buffer solutions

Temperature of solutions — 20–22°C.	
pH by	
Micro glass electrode	Standard glass electrode
3.97	3.98
4.64	4.63
4.58	4.60
4.59	4.59
5.58	6.00
6.89	6.89
7.69	7.70
9.27	9.26
8.69	8.70
2.35	2.35
3.11	3.12
4.23	4.25
5.47	5.45
6.64	6.63
7.94	7.93
9.11	9.12
10.24	10.24

Cleaning of glass electrode cup did not present any difficulty. A small piece of cotton-wool or soft filter paper was introduced to absorb the liquid and the cup was washed 2-3 times by directing a thin jet of distilled water on the end of the KCl-bridge and opening the stop-cock for a moment to flush out the end of the bridge. Once the electrodes were adjusted no need was felt for disturbing their relative positions thus ensuring the safety of the glass membrane. A thin layer of liquid paraffin on the surface of the solution has been found to prevent evaporation quite satisfactorily.

The glass electrode was tested thoroughly by using various standard buffers. The results were compared with those obtained by the standard glass electrode. There is a close agreement between the pH values determined by the micro-glass electrode and also by the standard glass electrode.

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December 9, 1946.

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A NOTE ON MOSAIC VIRUS OF SANN-HEMP (*CROTALARIA JUNCEA* LINN.) AND ITS CRYSTALLISATION

A MOSAIC disease of sann-hemp (*Crotalaria juncea* Linn.) was found to be of widespread occurrence during the early part of 1946 at Delhi.

The first visible symptom of the disease is mottling of the leaf. As the disease progresses patches of light and dark-green areas become more prominent. A diseased leaf is much smaller than a healthy one (Fig. 1); in the case of severe infection the growth of the lamina is abnormal (Fig. 2). Frequently, the dark-green areas on the upper surface of the lamina are raised with a corresponding depression on the under-surface (Fig. 1).

A microscopical comparison of sections of healthy and diseased leaves revealed some important differences in the mesophyll tissues (Fig. 3). In the chlorotic area of an infected leaf the tissue is thinner with fewer intercellular spaces, and in severe infection the mesophyll is not differentiated into palisade and spongy parenchyma; the cells are more or less isodiametric in transverse section. The chloroplasts in these cells are rather indistinct. No marked abnormality was observed in the vascular tissue of diseased leaves; occasionally, only a few cells in the phloem tissue were found to be hypertrophied.

Inoculation of plants by rubbing expressed sap from diseased plants transmitted the virus; typical symptoms appeared on inoculated plants within six to eight days after inoculation.